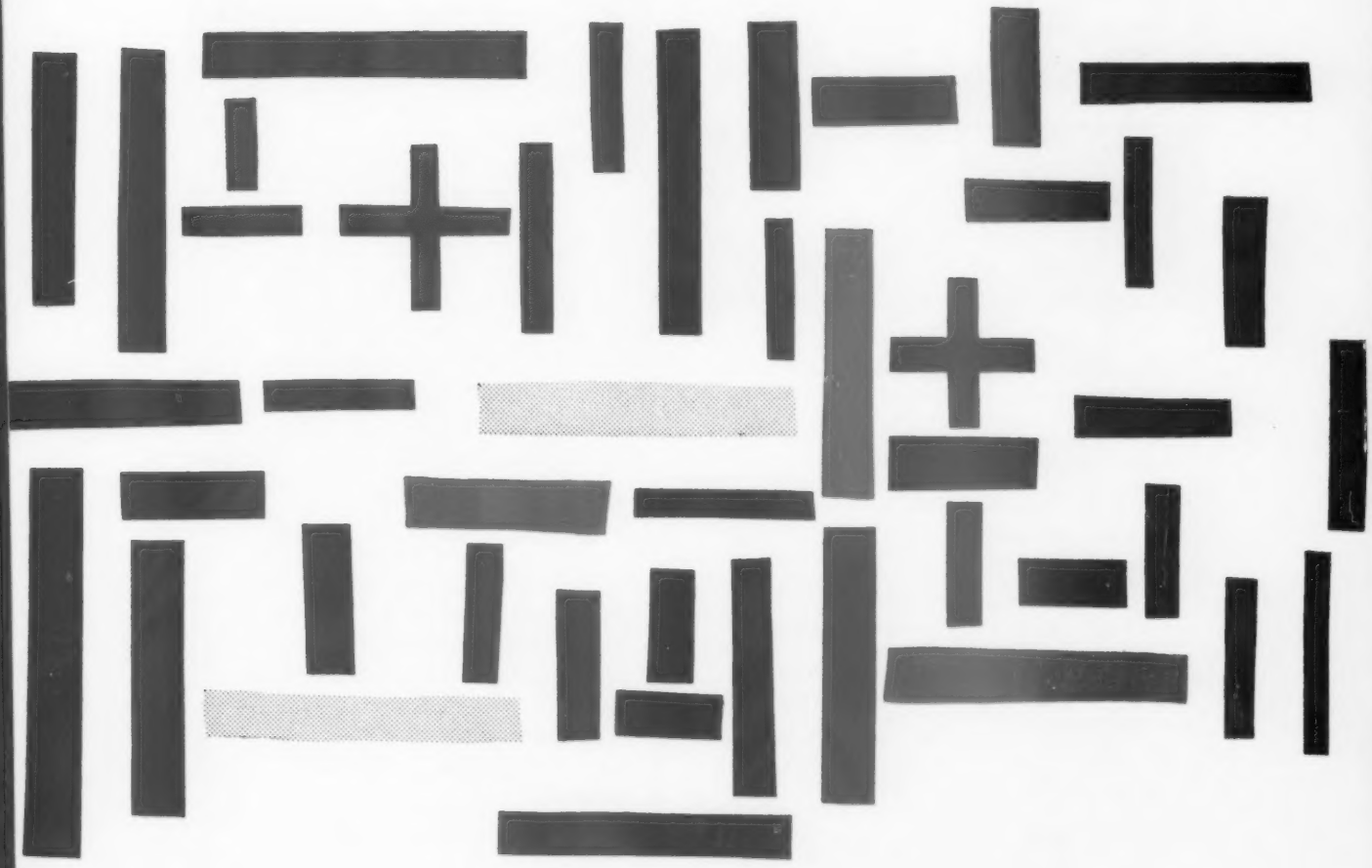
MAY 1961 3/6

AUTOMATIC DATA PROCESSING

JOURNAL OF MANAGEMENT AND INFORMATION SYSTEMS



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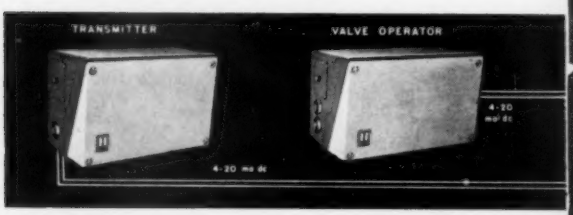

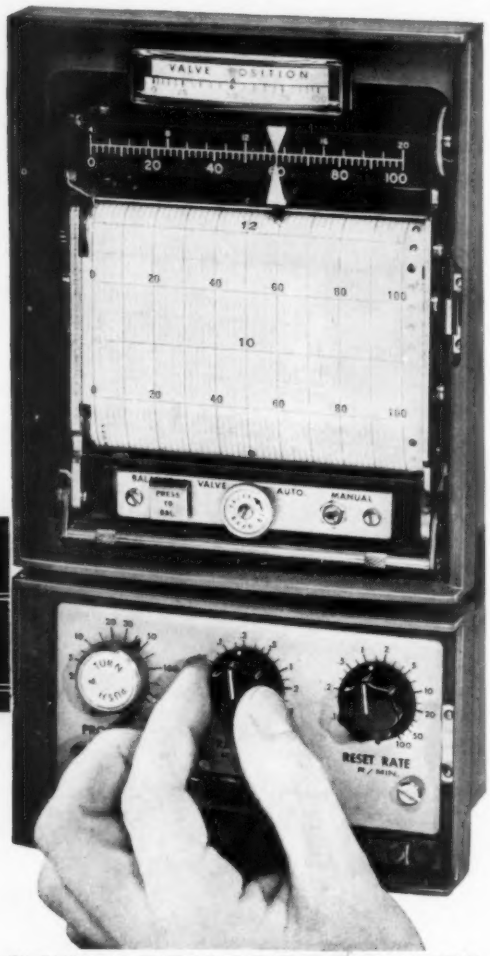

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AUTOMATIC DATA PROCESSING

JOURNAL OF MANAGEMENT AND INFORMATION SYSTEMS VOL 3 No 5

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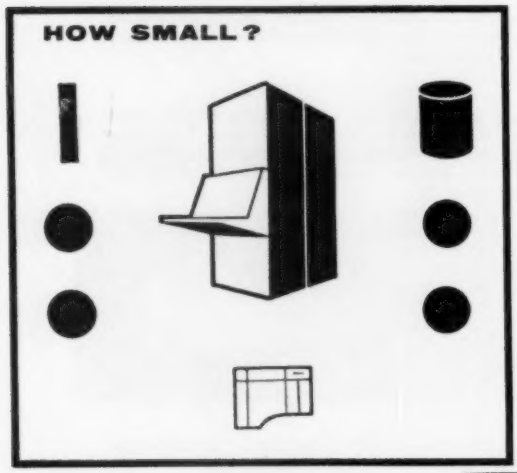

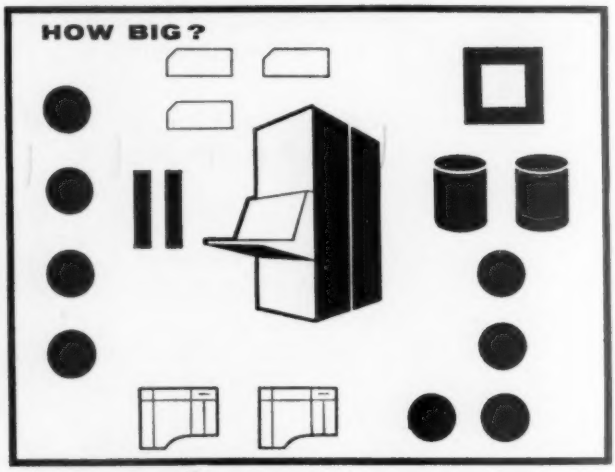

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AEI 1010

DATA PROCESSING SYSTEM

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When the tax comes

TALK of a payroll tax seemed so much in the air during the weeks when Mr Selwyn Lloyd was doing his homework on the economy that when on budget day the Chancellor announced he was 'seeking powers' to permit him to slap on such a tax at short notice it was no surprise.

One of the arguments for imposing a payroll tax seems to be that by penalising companies who employ large numbers the way is then open (once an employer finds the penalty irksome) to introducing automation and reaping a harvest of higher productivity.

This supposition, it must be said, is a piece of economist's speculation; it might be a good bet for accelerating the pace at which automation is adopted in manufacturing and production processes, but the suggestion has also been made that 'it would be a jolly good thing for the office automation industry.' Admittedly, a company with a *clerical* staff of 500 people would find, if the maximum rate of tax were levied, that its overheads would immediately go up by some £5,000 a year, and such industries as banking, insurance, and hire-purchase financing, whose employees are mostly clerical, would, of course, notice the increase more and be given added incentive to investigate automatic data processing.

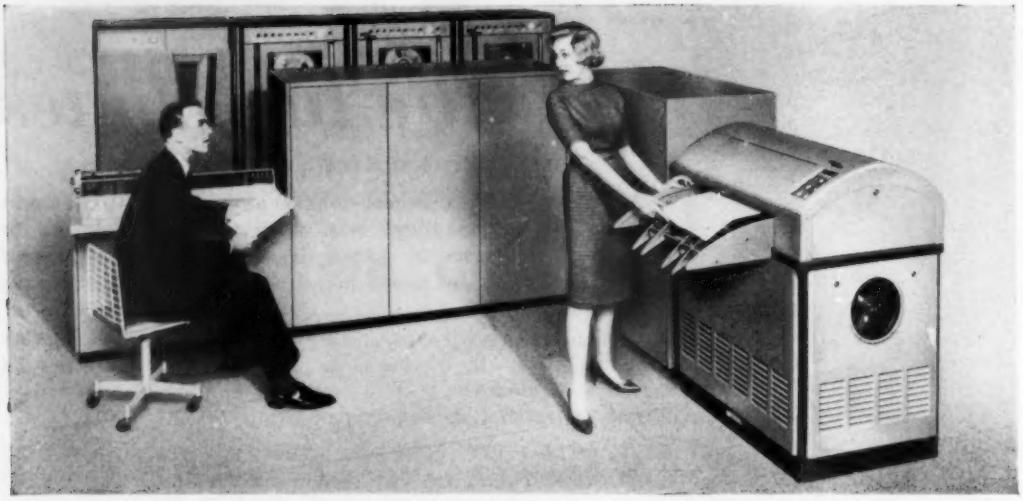
However—come the tax—a note of caution should be sounded. If clerical overheads rocketed, 'economic justifications' for introducing computers would ripen like plums in a heat-wave; the temptation for throwing out manual systems and manually operated accounting equipment would be strong, and in attempting to cash in on easy rewards many opportunities might be lost.

When the OEEC mission on electronic data processing which visited the USA last year learnt of the high cost of American labour, they understood why there were so many (proportionately many more than in Europe) computer installations on the ground: American companies could quickly justify 'going electronic'—but in the grab for the easy cost dollar, a number made mistakes. They bought the wrong equipment; they overlooked over-all problems; they did not always plan for expansion.

Crucial mistakes are easy to make; a company sees that a section of its clerical work—say labour costing and payroll—could be 'computerised' and costs cut; a card computer is ordered, considerable effort worth several thousand pounds is devoted to writing programs. Then it is discovered that more work is suitable for a computer, that the work can be *integrated* and that now the card computer is inadequate. So a larger machine is required, programs have to be written, and two years' work may have to be written off.

Simplified and necessarily dramatised as this example is, it serves to pinpoint one danger inherent in over-hasty leaping into automatic data processing.

'EDPM,' as the consultant told the client, 'stands for "every damn problem magnified."'



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METHODS OF INPUT

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Input Speeds–

- PUNCHED CARDS: 2,000 or 400 per minute
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  NOTE: UP TO 16 RANDOM ACCESS MEMORY UNITS may be linked for combined operation to provide random and/or serial access to over 130,000,000 numeric digits of information. (Over 80.000,000 if alpha-numeric.)

  SPEED: Information transfer rate is 100,000 characters per second

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  RE-ACCESS TIME: 0–31 milli-secs. (time-shared)

- **N·C·R MAGNETIC TAPES** (alternative to, or in combination with the RANDOM ACCESS MEMORY)

  OPERATIONAL TRANSFER RATES: 24,000 to 60,000 characters per second

News of the month at a glance

BOAC order a seat reservation system

By the end of the year the British Overseas Airways Corporation will be using an electronic information system which will provide ticket selling offices with the up-to-the-minute availability position for seats on all BOAC flights (and the flights of other airlines associated with BOAC). In some respects the system ordered is similar to one currently operated by SAS (which was described in the February issue of AUTOMATIC DATA PROCESSING).

Kernel of the system will be a central magnetic drum store in Airways Terminal, Buckingham Palace Road, London, on which flight information for 20 weeks ahead will be stored. Initially it will provide availability information to about 100 sales personnel using special enquiry keysets within the Terminal Building itself. Later, other enquiry keyset stations will be established at various points in London, and at London Airport, and these will be linked to the Terminal Building by telegraph lines.

After, further geographical extensions over standard telegraph channels will be made to the provincial centres in Britain such as Birmingham, Belfast, Manchester, Leeds, Glasgow and then to a number of cities in Europe.

Apart from the great scope for additional geographical expansion that the system affords it can be developed to perform other essential reservations functions—for example, reporting on sales and cancellations over long distances automatically and at high speed. When this stage of development has been reached the numerical 'inventory' of seats sold on each flight will be performed within the system. This development will require changes only in the central equipment but not in the keying equipment being initially supplied.

The existing manual methods of promulgating seat availability information by the space control centre to all selling offices are expensive in terms of manpower and excessively slow in processing. By adopting the electronic system, which has been developed by Standard Telephones and Cables, BOAC will solve a fundamental problem and will quicken the pace of selling activity.

With the new system, the availability information will be given automatically in a few seconds. In the initial phases booking will be carried out by telephone or teleprinter. The 'status' information will be kept up-dated in the central magnetic store by control clerks, though, in the later phases, this up-dating and seat inventory will be accomplished automatically, so that seats will be booked by a single push button operation.

Essentially a communications-cum-information retrieval system, it will comprise four main types of equipment:

The sales clerk's desk set: there will be a large number of these sets at Airways Terminal and at sales offices throughout Britain and Europe.

The controller's desk set: there will be several of these sets at the central control point in Airways Terminal.

The supervisor's console: located at Airways Terminal.

The information store: located at Airways Terminal.

Each sales clerk within the system will have access to a push-button unit for interrogating the computer store. A set of 'flight plates' (thin metal plates with standard flight information

printed on both sides) will be supplied periodically from the control centre and will show the pattern of flight information for 20 weeks ahead.

On receiving an enquiry the clerk will select the appropriate plate, which contains details of related flights, and insert this into the desk unit. Notches in the plate will operate micro-switches in the unit and identify the plate and the side which is being studied.

The clerk will then press buttons on his desk unit corresponding to the departure and arrival points on the sector of the route in question. He will also press buttons corresponding to the date and class for which a booking is required.

Having thus set up the interrogation formula he will press his ASK button to send this interrogation code at high speed to the central processing equipment. This information store can indicate one of three conditions for each flight on the flight plate: 'open for sale,' 'request' (*ie.* where limited seats only are available) and 'waiting list.' These replies will show up as a pattern of lamps on the clerk's unit as green, red/green together, or red respectively. A fourth condition where no lamps are lit indicates that the flight for various reasons is not available for sale. The availability status of up to 10 flights per interrogation on a given plate can be brought up for consideration by the clerk simultaneously. For example, where 10 flights to a common destination on the day interrogated are available the seat availability situation on these 10 flights will be presented simultaneously.

The mode of interrogation is extremely simple and will enable the sales clerk to offer alternative available accommodation where that originally required by the passenger is not available. Ascertaining seat availability conditions on adjacent dates will be carried out by merely depressing the new date button. Details of the transaction will then be sent to the appropriate space control unit by telegraph messages where they will be converted into orthodox punch card records.

The control clerks will be located in Airways Terminal and will be responsible for keeping the status information for all flights up to date in the magnetic drum information store. They will note incoming bookings and cancellations and when a flight is fully booked or booked up to a predetermined figure, they will change the flight status information in the drum store accordingly.

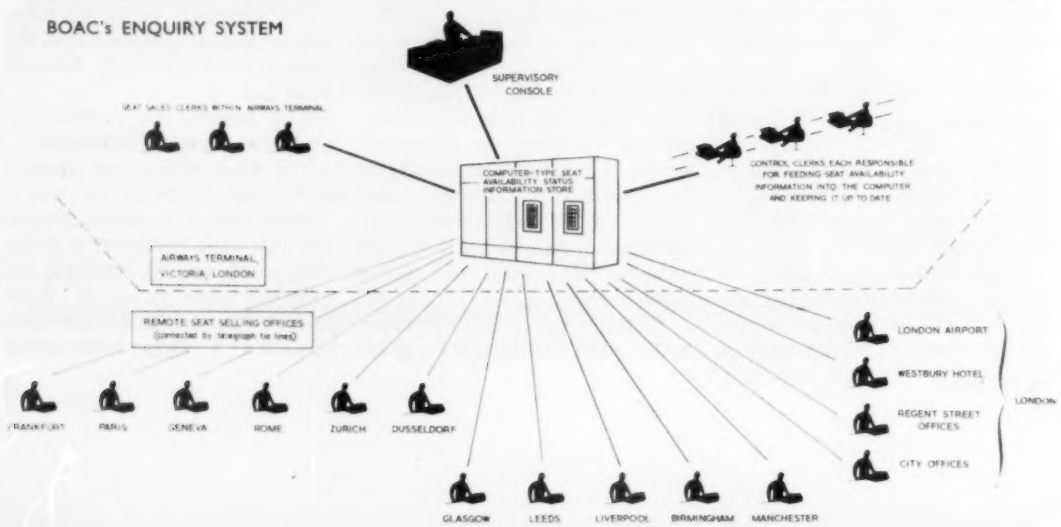
The control clerk's keyset is similar to that of the sales clerk but has additional buttons for feeding the magnetic drum of the information store with 'coloured light' status on any or all of the flights on any flight plate.

By pressing an ACT button, the control clerk will be able to cancel the existing information in the drum store and 'write-in' the new status information so that sales clerks' interrogations will always yield the correct answers.

The system will permit the control clerk to revise flight status in approximately one second and from that moment the revised information will be available for any subsequent interrogation throughout the network. The ability to reopen a fully booked flight on which a number of cancellations have been encountered represents one substantial benefit BOAC can expect from their system.

The supervisor's console will feature keys to enable him to initiate any of 12 different computer programs. Two programs have been described: these are initiated by the sales clerks and control clerks when they press the ASK and ACT buttons. The supervisor's equipment includes a key set for amending and checking information stored in the drum.

The other main programs which the supervisor will be able to initiate are: an automatic daily up-dating of availability information as each day's flights become redundant; storage of address and 'open for sale' condition when new flights are included; and verification procedures for checking the positions and alignment of information on the drum store.



Two drums will constitute the information store.

The drums to be used have 1,000 bit positions on 320 tracks. This method of storage allows simultaneous reading and writing on many tracks.

Flight status records will be written along drum lines each of which consists of a number of track positions along a common angular position. The length of a record is therefore determined by the number of tracks which it occupies.

Invoices galore

then depot stock control

Producing invoices and accounts for 5,000 orders each day on a range of 30,000 items—this, roughly, is the size of the initial task that the Dunlop Rubber Company will put on to a Leo III computer which is to be installed at Fort Dunlop in 1962.

Later, the computer will be used to control stocks of finished goods in Dunlop's 50 depots and base stores in Britain—in all some 28,000 different items of stock—then for breaking down sales and production requirements for purchasing and factory loading purposes, and for sales forecasting for all markets.

Preparing the 90,000-strong payroll at Fort Dunlop is also slated for transfer to the Leo III machine.

(Dunlop have also ordered an IBM 1401 computer for their Coventry factory and next month AUTOMATIC DATA PROCESSING will publish an article on the detailed plans Dunlop have for their two machines.)

Ledger talk

Ledger entries by card

Builders' merchants A D Foulkes Ltd have grown rapidly during the last ten years, supply a sizeable number of builders in the Birmingham and Midlands area, trade through 17 branches, and invoice for some 600,000 items a year—all of which serves to explain why the company recently installed punched card equipment.

Used for posting customer ledgers, and history cards, the equipment is additionally put to keeping fleet cost records, and working out sales and gross profit for each customer, representative, sales area, commodity group, method of delivery and supplying branch.

The card installation, supplied by De La Rue Bull, includes a calculator, a tabulator and sorters, collators and interpreters, etc, and also an IPC ledger posting device attached to the tabulator. The IPC makes it possible to use conventional ledger sheets with card equipment: it selects each sheet to be posted, makes the required entries, turns the sheet after one side has been completed and calculates the new balance. The IPC makes about 1,500 entries an hour.

The Brain Shop

50 *Technologists at Work*

There are (at a rough guess) a score or more companies in Britain with operational research departments, but although textbooks on OR techniques keep coming off the presses, very little is ever heard of what the OR departments are up to and what results they have produced. Consequently, it was surprising to find in the annual *Review of Progress* of United Steel Companies Ltd a page and a half on the company's Department of Operational Research and Cybernetics—one of the biggest 'brain shops' in Britain (it is said some 50 economists, mathematicians and other technologists are employed in the USC outfit).

Problems of planning and programming steel production have occupied most efforts: finding ways of making realistic delivery promises and of keeping reliably to them, and how to keep stock levels under control have been studied. Studies concerned with methods of re-ordering spares and of getting more out of existing plants have also been carried out.

The department has a Pegasus computer which has been used for simulation studies: by making a mathematical model of a works it has been possible to work out on the machine different methods of controlling the flow of production, for example, from melting shops to mills.

Cybernetics, which USC define as the study of control problems and organisation (drawing on the similarities of these systems with those that are found in nature—and in particular with the nervous system of animals and men), is the inspiration behind some machines which the department are developing—for example, a machine which will detect cobbles in a rolling mill *and then take corrective action*.

Standard Bank of South Africa Ltd

In the April issue of AUTOMATIC DATA PROCESSING in an article describing recent innovations at the head office of the Standard Bank, we inadvertently referred to the Bank as a 'small bank.' In fact the Standard Bank is a considerable organisation with some 800 branches in the Union of South Africa, the Rhodesias and East Africa and with total assets in excess of £370 million. The article referred to innovations only at the Bank's head office in London, and we apologise to readers and the Standard Bank for suggesting the Bank operated only on a limited scale. This in fact is not so.—*Editor.*

Shortest Distance

70,000 *pairs of straight lines*

An important book for the airline industry published recently was entirely 'written'—all 420

HOW IT GOES 'ON THE BILL' AT THE MAY FAIR HOTEL

The use of punched card equipment for preparing itemised hotel bills is fairly widely accepted, and a number of the larger hotels prepare bills in this way. However, every hotel has the problem of making sure that the accounts department is quickly notified of any chargeable service a guest may use—for example, after a meal has been served to a guest in one of the hotel's restaurants, there must be no delay in notifying the mechanised or punched card accounting department.

To overcome this problem the May Fair Hotel (London) has recently installed a number of simple keyset devices, located at strategic points in the hotel, which are connected by cable to an automatic card punch in the accounts department. These keysets (developed by the 'special projects' division of ICT) are used to enter a guest's room number and the amount charged, and enable a 40-column card to be punched automatically, so that it can be used later when a guest's bill is being tabulated.

In the hotel's Beachcomber Restaurant—noted for its exotic Polynesian decor and its ever watchful alligators lying in a pool—one keyset has been installed. When the restaurant cashier receives a changeable bill from a waiter, she first checks her set is 'ready'—this is indicated by a green light and means the punch is switched on in the accounts department, has blank cards ready, etc. Then she keys in nine numbers—five for the cash amount, three for room number and a code digit; as each number is keyed in it lights up on a panel indicator, so that when the nine numbers have been keyed, the cashier can check them. If all is correct she presses a 'punch' button which locks the numbers; a red indicator light then glows to show the punch is being 'paged.' . . .

pages of it—by an electronic data processing machine.

The publishers are the International Air Transport Association, and the book will be used for working out fares between 70,000 pairs of points on the world air network.

It represents the culmination of almost three years of preparatory work by a special IATA computer working group, and is the first substantial step toward the possible eventual computation of all fares and rates by electronic means.

The IATA *Mileage Manual* gives airlines the shortest operated distances between selected pairs of 1,600 cities on the world airline map. While an almost infinite variety of routings between these points is possible, the lowest fares to be charged are controlled by the most direct routing, with certain allowable deviations for the actual itinery. The manual will now be the authoritative statement of these routings.

Preparation of the new manual involved over 800,000,000 mileage calculations. If done manually, the job would have required

. . . then in the punched card department if the automatic punch is not in use a 'hunter' unit searches which of the five keysets last transmitted, disconnects and switches the punch to the Beachcomber restaurant's connection. A card is then punched at high speed. Each keyset is connected to the automatic punch by a single multicore cable.

Guest's bills are tabulated on this 40-column card tabulator. Cards are collated, as they are prepared, in the wall rack on the right, so that little sorting is required to prepare a bill.

1,000,000 man hours of computation (a year's employment for 500 men).

The manual was turned out entirely by machine. Non-stop sectors flown by individual airlines were fed into an IBM 704 computer equipped with magnetic tapes. The machine then calculated the various combinations possible, selected the shortest routing applicable between each pair of points concerned, chose four intermediate points to indicate the routing and printed the result automatically on lithographic master pages.

While 36 months were needed to organise the project and prepare the data for the computer, final computation and production of the 420 master pages took only 30 hours. To calculate all reasonable routings from any one city in the tables to all the rest and select the shortest operated mileages takes 12 seconds.

The new manual has revealed the fact that there are now more than 4,000 non-stop flight sectors operated by IATA airlines and other air carriers. The longest listed is 4,692 miles, between Anchorage and Paris; the shortest, 13 miles between Kamalpur and Khowai in India.

According to J E McGuire of Pan American World Airways, chairman of the 11-man IATA computer group, the new manual has additional significance as the airline industry's first co-operative effort to produce the raw material for routing.

With the blessing of the IATA traffic conferences, the group is now evaluating a 'model trial fares table' based on routings via the mid-Atlantic, which it is hoped will be the pilot project for producing worldwide fares tables on electronic computers.

Actual calculation of the mileages was carried out on IATA's behalf by the industrial research firm of Arthur D Little, Inc, of Cambridge (Mass), under the direction of Dr Arthur A Brown.

Describing the complexity of the job, Dr Brown stated that the number of all reasonably possible routings between the 1,600 cities concerned 'is so large that you couldn't write it down within the solar system.' However, the research team found a way to make the computer take the best routing choice at each stop, and so reduced the job to manageable proportions.

Information now contained in the manual is stored away on 10,000 feet of magnetic tape which can be run for additional computations. The manual itself will be kept up to date on a biennial publication schedule, and is available to outside parties at $100 per copy. Tape and punched card versions are also available at cost.

Specially designed to be in five places at once

(and in next to no time)

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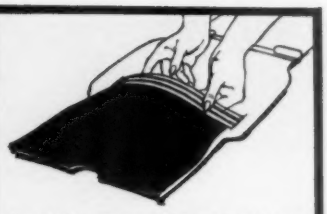
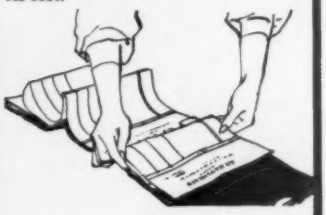
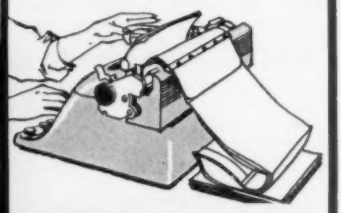
CAT-LINK gloves with up to five carbons are cheap to buy, easy to use and foolproof in action. Can we tell you more about them? Continuous and cut set stationery can be used in any office, but expert advice will help to make the best use of either. This service is freely offered by A. J. Catlin Ltd; why not find out what benefit it can be to you.



Cat-Link is a glove device in which a set of carbons is securely held. The continuous stationery is not interleaved with carbon, thus substantially reducing its cost.



The stationery is threaded through the glove and between the carbons and the complete set is fed into any standard typewriter like an ordinary letter.



On reaching the bottom of the first form a bar attached to the end of the glove runs up against the platen roller, preventing the further feed of the glove.

The paper feed is released, the forms pulled clear and torn off at the perforation. The paper feed is re-engaged and the stationery moved back into line for typing.

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From the first, it was a close partnership between the two great firms at all levels, from directors down to departmental staffs; an unprecedented example of co-operation in computer development. BMC had the foresight to devote all its talent and resources to the operation. In fact, today's new generation of business computers owes as much to BMC as it does to EMI.

Months of combined research and analysis produced a detailed summary of the exact information and statistics the machine must handle. The computer that resulted still deals with the vast Austin payroll and supplies management with statistics in minutes, instead of weeks.

BMC went on looking years ahead! Even before their first computer was installed, BMC had ordered another—one of the new EMIDEC computers; this will handle sales invoicing, sales accounting, receipt and analysis of orders, production scheduling, sales statistics and stock analysis. A bold act, to order two such large machines at once! *Thank you, BMC!*

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'our Ferranti computer certainly helped us'

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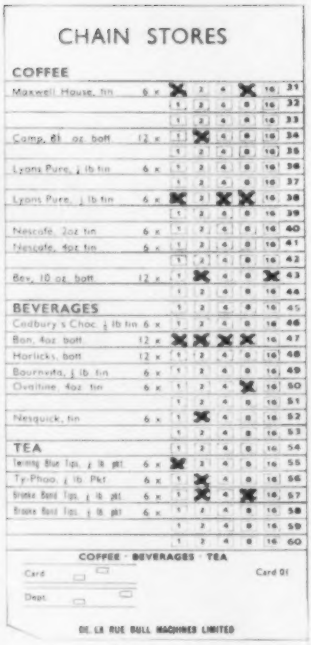

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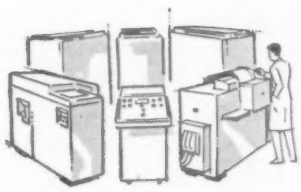

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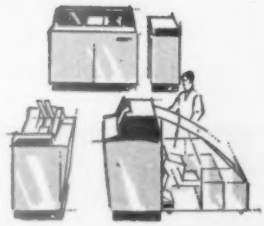

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BUILDING SOCIETIES | **1**

This Home-buying Business

With some four and a half million investors and about two and a half million borrowers, building societies—particularly the larger ones—would seem to be 'natural' for up-to-date data processing equipment, yet curiously the societies have shown little active interest in automatic data processing. Our correspondent, Robert McKinnon, has been investigating why this is so, and in the first of three articles takes a look at what makes the industry tick and what its problems are

WITH one or two notorious exceptions, whose peculations the law has been swift to punish, the building society industry rightly projects an image of massive respectability whose most salient features are security and caution. The industry goes back to 1845 when the Chelmsford and Essex Building Society was formed. Others followed with remarkable rapidity, so that by 1874 when the first comprehensive legislation was introduced to govern the operations of such societies, the industry was already regarded as a safe haven for investment, particularly for the small investor who was looking for a modest but secure return on his capital.

This is essentially the image projected and encouraged by the industry today. It seeks to attract capital not by the prospect of swift and spectacular dividends but by the assurance of a steady, tax-free rate of interest and by its traditional reputation for integrity, simplicity and meticulous attention to individual accounts. For proof, one need look no farther than the average society's advertisements (aimed more at the investor than the borrower) which for the most part are content to state tables of comforting statistics.

The formula has succeeded to an astonishing degree, though in recent years it has been helped by the social and economic changes taking place in Britain—changes which, among other things, have stimulated the effective demand for home ownership at a time when suitable housing is still in short supply. Anyhow, each year has witnessed an increase in the number of building societies and at the end of 1960 there were some 750 of them operating in Britain sharing a total investment capital of about £3,200 million entrusted to them by some four and a half million investors. (A simple sum shows that the average investment amounted to just over £700.)

On the lending side, it is estimated that more than four million people have bought or are buying houses through building societies in the 16 years since the war ended. At the end of 1960, the number of borrowers was estimated at 2,330,000 compared with 2,245,000 at the end of 1959 when the industry's investment capital

was about £2,900 million. In other words, during 1960 investment in building societies rose by about £300 million and the number of mortgagors by about 85,000. Nor is there any indication that this upward trend is slackening. On the contrary, although house prices are rising, more and more people seem to be buying lest they be priced out of their particular market at a later date.

A major attraction of building societies for the small investor is the simplicity of the investment procedure. Most societies will accept a sum as low as £1 for opening of an account, and the investor does not have to pay stamp duty, brokerage fees or commission. Moreover, it is equally simple to withdraw capital, for most societies pay up on demand whether it is convenient or not for them to do so. All this, in addition to a reasonable and secure rate of interest, explains why the industry does not usually find it difficult to attract funds.

From the facts and figures quoted, it is clear that a vast amount of data processing takes place daily in the industry, so here, it would appear, is a particularly fruitful field for modern data processing systems. And, of course, it is a field which a number of firms selling such systems—notably National Cash, Burroughs, IBM and ICT—have been investigating. Yet not one building society has to date computerised its operations nor, so far as is known, has any planned to do so in the near future. What is more, although many societies use the latest electro-mechanical accounting machines, only one or two use punched cards in their data processing operations.

HOW A SOCIETY OPERATES

This, on the face of it, suggests that the industry is conservative in the pejorative sense of the word—namely, that it is strongly resistant to new ideas. But there are a number of other factors to be reckoned with, so it is best first to look briefly at how a building society operates.

Most people when borrowing from a building society say a number of unkind things about the stipulation the society makes that interest on the capital borrowed must be repaid before the capital proper. Yet not only in theory but in fact building societies are non-profit-making bodies whose depositors and shareholders are not paid fluctuating dividends but a fixed rate of interest. Every society lives by borrowing money at a certain rate of interest and lending it at a slightly higher rate. Many societies borrow at 3½ percent tax paid which in the ordinary way would represent a gross rate of interest of £5 14s 3d per £100 and lend at 6 percent. However, they enjoy an arrangement with the Inland Revenue whereby they pay a composite rate of tax on behalf of investors. This composite rate leaves the majority of societies with something between 5s 3d and 7s per £100 to put to reserves after all running expenses have been met. Running expenses include, of course, directors' fees (which are generous), salaries, accommodation, heating, lighting, office equipment, depreciation, sundries and the like.

Most societies think that the proportion of their monies which they are able to put to reserves is far too low, but they are reluctant to raise their rates of interest to borrowers for they do genuinely give priority to promoting home ownership. Nor are they able to reduce interest paid to depositors; a careful study of the money market has convinced them that 3½ percent tax paid is just enough to attract the funds they need.

The biggest data processing operation of any society is, of course, keeping its investors' and borrowers' accounts up to date. As can be seen from the figures quoted earlier, investors in building societies outnumber borrowers by about two to one and, of course, investors can deposit or withdraw sums whenever they wish. On the other hand, each borrower's account must be adjusted every month. As a rule, investors' accounts do not require such regular attention though interest is paid on these accounts every six months. Another routine data processing operation consists of the annual completion of income tax cards for the Inland Revenue. These must state the mortgage interest for the current fiscal year and the estimated interest for the fiscal year to follow.

Clerical and statistical work in building societies is increasing for other reasons. Under the House Purchase and Housing Act of 1959, societies whose liquidity and reserves exceed a certain minimum proportion can qualify for trustee status, while the Building Societies Act of 1960 lays down certain safeguards on lending policy and investment of surplus funds. Both these pieces of legislation require the provision of more financial information.

TO CENTRALISE—OR NOT

A building society may do its accounting and other paperwork on a centralised or decentralised basis. As often as not, the choice is determined more by the number of branches and their size, by geography, availability of staff and by tradition than by purely theoretical considerations of simplicity or efficiency. As a general rule, the larger societies have centralised systems whereby most of the calculations are done at head office on information received from the branches, while the smaller societies often do their accounting and other statistical work 'on the spot.' Whichever

system is in force, head office has, of course, a complete central records system.

We can return now to the question of 'conservatism.' The building society industry admit to conservatism. And the main reason for this being that every building society must pay the most scrupulous attention to costs of operating, and this is why there is not likely to be any spectacular break-through of automatic data processing into this field. ADP might produce lower operating costs, but a society would first have to meet the capital cost of equipment.

That is not to say, however, that the field is closed. Practically every society would vigorously deny it is unconcerned with new and more efficient methods of working, and our investigation indicated that quite a number of societies had studied modern data processing systems. For instance, the following question was put to a number of societies large and small: —

> Many banks and insurance companies are already introducing data processing systems based on computers and/or punched card installations. Others are investigating such systems. To date, there is little or no evidence of similar innovation among building societies. Are your problems radically different, or it is simply that your industry is more conservative?

The following is a selection of replies received: —

1. A building society in the south of England: —
'. . . *Reserves are difficult to maintain and any heavy expenditure on the replacing of systems might have an adverse effect on the small reserves available . . . Our branches are too small to justify the cost of an automatic link with our head office . . . our policy of decentralisation gives a number of small accounting units within one society.*'

2. A society in the north of England: —
'*Building societies have different problems from banks and insurance companies . . . and the many systems designed primarily for these will not meet our needs.*'

3. A society already operating a punched card data processing system: —
'*Where building societies operate on a decentralised basis, the units keeping accounts can be quite small, and devices other than the usual keyboard book-keeping machines are difficult to justify. There is a great cleavage in the movement between those societies which believe in central maintenance of their members' accounts and the others which believe in local maintenance at branch offices. A case for the new mass-production techniques can be made only in the case of the large centralised units.*'

4. A large building society in Yorkshire: —
'. . . *Many building societies are comparatively small and do not have enough accounts to justify the cost of expensive equipment. Keyboard accounting machines cope extremely well with their problems. The larger societies will probably take advantage of the new machines which are becoming available.*'

These replies are a fair sample, and it will be noted that three out of four mentioned cost and that two out of four were quite convinced of the adequacy of electro-mechanical accounting machines. Our survey also revealed that few, if any, societies have any real problem in getting out financial information in time. Indeed, one large society (whose operations will be explained in greater detail in a subsequent article) found that seven accountants could more than cope with supplying regularly all the information its management required, and if it were to computerise its operations it would not be for that reason.

THE BIGGER GET BETTER

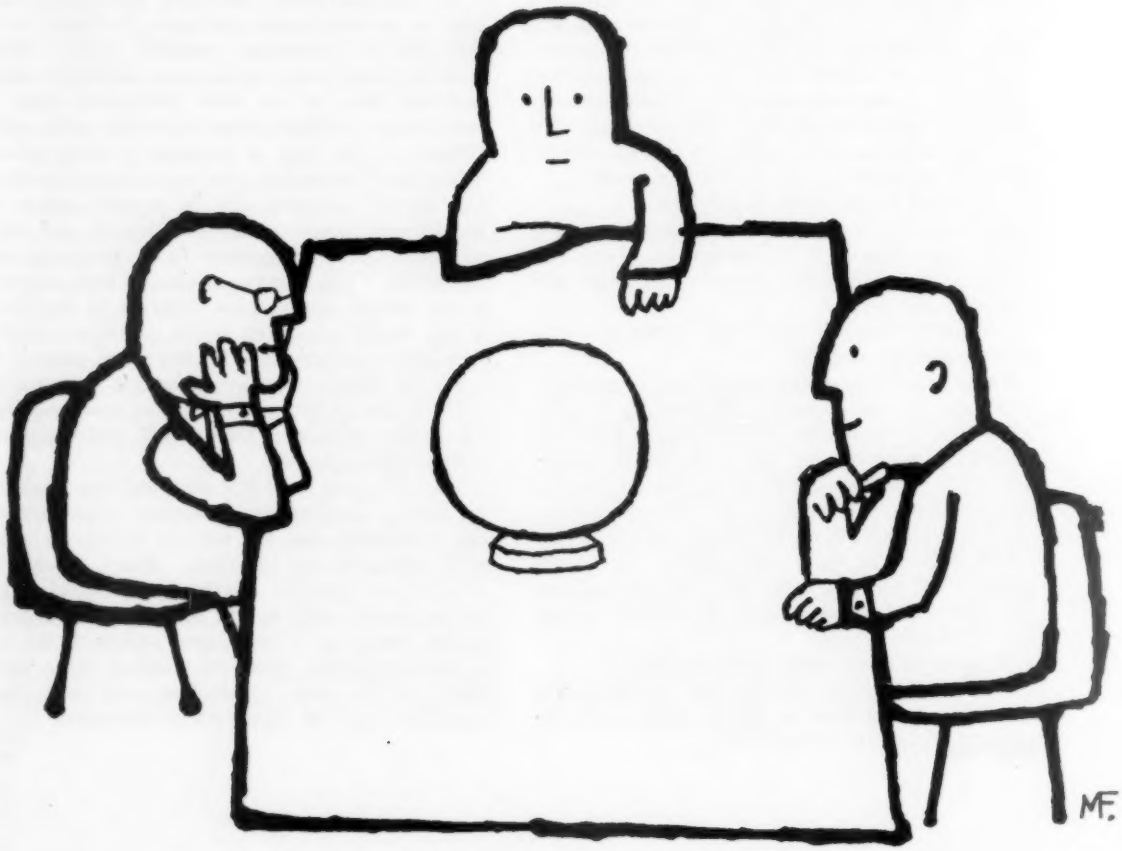
It seems clear, too, that small societies working on a decentralised system are unlikely to go over to automatic data processing systems—even the simpler, non-computer systems. This leaves the medium and large societies who work on a centralised basis, and here there is a possibility that punched card systems will eventually be introduced and, in a handful of cases, a computer installation.

Among these latter, the main reason for going over to automatic data processing is likely to be difficulty in recruiting suitable staff. Most societies who were questioned admitted some problem here or at least anticipated that a recruitment problem would probably arise, particularly in the case of branches in large towns where more interesting jobs were often to be had. One society admitted that its present system of recruitment 'seems to favour salesmen and contact men so far as apparent future prospects are concerned.' The impression gleaned from answers to the human implications, however, is that few, if any, building societies would dream of dismissing large numbers of their employees even if it could be shown that an automatic installation could do the job better or even more economically. Like other industries, they would prefer not to replace retired people.

Thus, it would seem that most building societies are noting developments in modern data processing techniques but are not yet convinced that such techniques are for them. But it would be wrong to say that the industry has a closed mind on the matter, and, as will be shown in the next article, there is at least one society which is operating a system based on punched cards very much to its own satisfaction and with no complaints from its depositors or borrowers.

A Crystal Ball for the Businessman?

Is simulation a promising new tool for analysing the workings of businesses and economic systems? In spite of a score of computer simulation projects on American university campuses it is still too early to decide



AMERICAN REPORT

from John Diebold and Associates, New York

CONSIDERABLE intellectual excitement is being generated in university circles by the realisation that the application of new second-generation computers to problems of simulating organisational and economic processes make it possible to learn considerably more about our business and economic systems than could ever be learned by conventional research methods.

The interest in simulation's potential is by no means limited to academics. Increasing numbers of business and management people are participating in discussion and conference groups exploring this subject. They have been quick to recognise that the impact of this methodology could easily force extensive adjustments in organisation alignment as well as drastically modify many fundamental tenets of business philosophy.

Perhaps an example can illustrate what simulation will mean to management: suppose that a company decides to increase its sales in a specific product area. When it makes this decision it has a 20 percent share of the market. A sales programme is organised which the company believes will enable it to trim an additional 15 percent from the competition's share so that in the final stages of an 18-month effort, the company will capture 35 percent of the total market.

New distribution channels are organised. Additional warehouse space is acquired. New production facilities are built. The sales force is enlarged and the advertising budget is doubled.

One morning a year and a half later, the vice-president in charge of sales gleefully reports to the president that the programme has enabled the company to overshoot its previously established goal by a handsome margin. Instead of achieving the original objective of 35 percent, the company is now selling to almost 45 percent of the market!

Management is in a state of exuberance until the company controller makes a shattering revelation: for every dollar of new business that the company has earned, it has spent nearly one dollar and ten cents. While the president ruefully ponders how this situation will be explained to the stockholders, he daydreams about a method that would have enabled him to 'look into the future' —an analysis that would have shown him conclusively that 20 percent was actually the most profitable share after all.

A simulation on a computer might have provided the information which would have enabled this company's president to anticipate the magnitude of the increased costs, enabling him to veto the programme before it got off the ground.

By pre-testing business programmes and systems through simulation, management will be far better equipped to measure qualitatively inherent strengths and weaknesses than it ever was before. Of course, an accurate description of all of the internal and external environmental factors which could affect the development of the system being simulated must be made before the simulation is attempted. This description is usually called a 'model.'

According to Guy H Orcutt*: 'A model of something is a representation of it designed to incorporate those features deemed to be significant for one or more purposes.' Maps, for example, are models of geographic areas; they incorporate spatial, and topographical features of the areas they represent. Other kinds of models describe more subtle features of systems, such as how the subject of the model responds to external stimuli or how its own development affects the environment in which it is operating.

Whether a model is a physical representation, expressed in conventional prose, graphically portrayed by pictorial geometry, set forth in the language of formal mathematics, or presented as a computer program is essentially a choice of convenience. Sometimes it may be easier to initially develop models of business or economic systems in the language of formal mathematics.

If the model is a good one, it should be possible for the computer to examine the effect that nearly any change in management control would have on system performance. This might include, for instance, an estimate of the way that changes in an organisation could effect information flow rates, time lags, bottlenecks or queuing in a given system.

It is obvious that the simulation approach to business and economic system analysis has emerged as a direct consequence of the recent revolution in computer technology. The economists themselves are the first to admit that the computer represents the only practical way now open to us for the continuing study of dynamic models of economic systems.

Computer simulation is not the only method there is to approach the solution of economic systems problems. But it certainly is the one technique which offers the most promise. No one

* 'Simulation of Economic Studies', page 897, December, 1960, issue of *The American Economic Review*.

can safely say with any finality that purely deductive mathematical techniques could not be developed to do the same kind of analysis that a computer simulation would provide. On the other hand, even if we assume that suitable mathematical techniques *could* be developed, we have no assurance that they would not be obsolete before they could be used.

Consider, for example, the rapid progress being made in the field of research surveys, the continually improving methods of data collection, and the advent of multivariate statistical techniques of estimating non-linear relationships. Obviously future models of business and economic systems will be far less adaptable to conventional mathematical analysis than models being developed today. This means, of course, that the importance of computer simulation as a business and economic system analysis tool will be enhanced considerably in the future.

In the relatively short span of 36 months, simulation of economic and business systems has grown from a few isolated attempts to at least a score of continuing, full-time operations. Despite this remarkable record, much still remains to be learned. In fact, most current projects are more experimental than operational. The lion's share of the *new* effort is still being monopolised by the universities.

There are indications that interest in simulation may spread beyond the universities in the near future. One of these comes from a recent pilot conference on the 'Impact of Feedback Control Concepts in the Study of Economic and Business Systems.'† Although only five of the 19 speakers who addressed the conference were from private industry, conferees were predominantly business people.

CURRENT ACHIEVEMENTS

However, the simulation of a business or economic system on a computer is neither as easy nor as straightforward as some simulation proponents would have us believe.

Most of the simulation projects now under way fall into one of three broad categories:

(1) Simulations concerned primarily with the internal functions of a business organisation.

(2) Simulations dealing with the business organisation and its relation to its environment.

(3) Simulations of industries or aggregations of business organisations.

One project in the first category involves the simulation of the internal organisation of a department store. In this case, the simulation is concerned with the allocation of internal resources and with what happens when prices are altered. Modelling problems in this type of simulation unfortunately are formidable.

Work in the second category usually is related to forecasting, inventory and pricing policies of the company, its distributors and the retailers. Objective of such programs is the development of a data organising device that will make it possible to gather and structure information efficiently. The model ultimately developed from this information would be used for sensitivity analysis of changes in policy, decision rules and market structure.

A list of those academic centres which are now conducting experimental economic and business simulation projects would include the University of California; Carnegie Institute of Technology; Case Institute of Technology; Massachusetts Institute of Technology; University of Michigan; Northwestern University; Ohio State University, Harvard University; and Purdue University. There are also a number of additional colleges which are planning to initiate programs in the near future. The importance of simulation to the academic community was summed up recently by Yale University's Martin Shubik. He said:

'Simulation studies promise to provide the way to add the richness (in terms of explicit consideration of marketing costs, marketing variables, and organisation structure) needed to obtain adequate theories of an organisation's pricing and market structure. This new methodology will not only make it possible for us to construct more complex theories but to validate them as well.'

At present, the most valuable aspect of simulation as a business system analysis tool is the discipline which it imposes. For the first time, companies are being forced to analyse and justify every facet of internal business procedure. This step alone is uncovering many weak spots and costly operating deficiencies. Although simulation methodology may not be providing useful answers to policy questions for another three or four years, lessons learned in development of the models themselves are leading to the discontinuance of wasteful practices and unnecessary operating and capital expenditures.

The real world is still orders of magnitude more complex than any simulation which can be handled on present-day computers. Consequently, economists, scientists and management men need to think—and think hard—about the significant elements of the business system and its environment which need to be incorporated in a truly representative simulation model. This must be done if we expect computers to provide reasonable and useful answers to the questions.

† Sponsored by the American Institute of Electrical Engineers, the Institute of Management Sciences, the Foundation for Instrumentation Education and Research, and supported by a grant from the National Science Foundation.

How Gamages Sort Mail Orders

By utilising cash registers equipped with tape punches a London department store can cope with up to 6,000 10-line mail orders per day, and produce weekly sales analyses of all goods sold by 55 departments

David Roach Pierson

COMES the spring, comes the mail order catalogue (though its appearance is not confined to one season) when thousands of people all over Britain indulge in long range shopping; people in remote places or in towns with inadequate shopping facilities are presented with an additional shopping opportunity and an enticing and usually colourful catalogue acts as a 'still' supermarket of household durables, gardening and domestic implements, and even clothing. The result is that mail order trading is now big business: at peak buying periods, orders, each requesting as many as 10 items in the catalogue will flow in, and these orders may be worth anything from a few shillings to £30 or more.

Though firms like Great Universal Stores and Littlewoods dominate, there is still room in the mail order business for the smaller concern, and in particular for retail organisations, for whom selling by mail can be a profitable sideline. A W Gamage, the London department store, provide an example of a

Two machines are used to enter sales details in random order. Tape punches are housed in the compartment on the left on each machine.

retailer with such a sideline—one, in fact, that accounts for about a third of their cash sales.

Gamages rate as a medium size mail order concern. They receive and process more than 600 orders a day, though at peak periods, such as just before Christmas, this figure will rise to as much as 3,500 to 6,000. The pre-Christmas orders are also the heaviest: up to 15 separate items, requiring action from as many different sales departments are common during this period. Consequently, how to keep track of these orders, how to notify departments of requirements and how to prepare sales statistics by department becomes a problem. Recently, however, the company have cut through this problem by acquiring two simple office machines and further by making use of the services of a computer bureau.

Heavy buying always follows the publication of the catalogues in the spring and in the autumn; that is when the multiple item orders begin to flow. Whereas Gamages do a great deal of Press advertising in the nationals, the response to these do not present the same problem, because they are mostly one-item orders. It is the catalogue orders that are the major headache, because of their diversification.

The procedure for dealing with orders runs through three stages: first, the cash reconciliation or credit sanction of the order; next the preparation of the 'action' documents (the delivery note, bin note, requisition orders on the various departments, and accounting copies); and finally the order dissection. It is for this last stage that Gamages have decided to introduce a measure of mechanisation.

Orders are normally received at 7.30 am. in the post department, and are separated there into cash orders and entry orders. The cash orders are marked 'money enclosed' and the cheque or postal order is attached. These orders go forward to the cash posting department, where the amounts are checked and entered on a battery of cash registers. The reconciled orders then are passed to the mail order department for processing. The entry orders are passed to the credit sanction office, and, on approval, proceed to the mail order department.

Up to now the source document has been the customer's own letter. Now a set of action documents is prepared on a typewriter. These sets are continuous preprinted systems forms, which are so designed that as many as 10 copies may be produced at one typing. The customer's name and address, and details of his orders are entered, together with 'picking' instructions for the various departments, and assembly, packing and delivery instructions. These sets are then routed, a copy going to each department concerned, and a copy going forward to the counting house for sales dissection.

In the counting house the copies go to the dissecting department where the orders are checked and listed by departments. This is done in two stages; first a clerk checks the correctness of the previous calculations made and makes a checking sub-total against the items sold per department. The orders are then listed by department and totalled.

Now it will be seen that with a small number of orders in the pipeline, and one or two departments involved in every order, this breakdown of sales per department could be done manually. Indeed until the end of last year it was done this way—with an assistant sitting down with an elephant-sized piece of paper on which 50 of the departments most used were listed. The orders would be examined and the sales per department manually transferred to the sheet. The small percentage of goods requisitioned on the other selling departments were listed separately.

These manually prepared lists were totalled on a Burroughs adding machine and from this the weekly department sales analyses were produced. However, orders were being received at a rate of 3,000 per day, with 10 items and as many departments involved,

and the manual system became severely overloaded. At Christmas, 1959, 22 clerks working full-time and substantial overtime were needed to deal with the Christmas rush. But there was feeling that this crisis-working must not be allowed to recur, and Gamage's company secretary looked round for some method to raise the pressure, before the next Yuletide avalanche.

Almost all the sales departments, including the mail order department, utilised the cash registers for their operations, and the possibility of using cash registers equipped with paper tape punching attachments was thus explored.

THE INITIAL PLAN

Basically the idea was that when the orders had been checked and sub-totalled, they would be passed to an operator working a tape-punching cash register. She would simply enter the amount of the sale and the number of the department on the keyboard and these details would be punched into five-channel paper tape. At the same time a grand total of the sales for all departments would be accumulated and printed out for checking purposes.

The advantage of this system was that it did away with the manual selection of the department followed by the manual entry in the appropriate column. This had always been the slowest job, and the one most liable to error when the operator was tired or her concentration lapsed. The operator would have no 'field selection' to perform, but would simply punch on the entries in the order in random sequence, as they occurred on the form.

Consequently, two Sweda cash registers with built-in paper tape punches were acquired, with the intention that the information punched out into tape would be subsequently analysed automatically on a computer.

The dissection was thus to be made the responsibility of a computer, which would round off the job and print out the analyses. The punched tape for each day's transactions would be held until each Monday afternoon. In this way the latest possible information could be obtained for processing. At 4.30 pm. a messenger would collect up the tapes and take them along in a suitcase to the Ferranti computer centre in Newman Street. There the tapes would be read either into the Pegasus or Sirius computer by high speed reader. The computer, programmed with a 'pigeonhole' program, would select items under the various departmental heads, total sales per department, and to print out the totals. This is child's play to the computer which eats up 150,000 items of information (3,000 orders per day by 10 items per order by five days per week) in about 15 minutes. The sales statistics would then be sent off, to arrive by first post on the Tuesday morning for distribution to sales executives.

That was the scheme as envisaged. In fact, it worked out just as planned—with one variation. It was intended that two Sweda machines—one for cash orders and one for entry orders, would be delivered at the slack period of the year, July-August, so that they could run in parallel during those months with the manual system. However, due to technical and other hitches, the machines arrived in late October, when the Christmas build-up was already under way. They were put straight into action, so the two cash registers had their field tests 'on the battlefield.'

The new system worked well so that despite a sales increase of about 10 percent, the work of sales analysis last Christmas was carried out with 16 staff — as opposed to 22 in 1959—and with considerably less overtime; the 16, too, were concerned with the checking function mainly, which was necessary for ascertaining the correctness of the mathematics in the earlier stages.

Mr F H Forsythe, the company secretary, is satisfied that the statistics being produced are more accurate than under the old manual method. The checks are sufficient to ensure a substantial degree of accuracy, and there is now almost no risk of the wrong entry under the wrong column. One whole document writing operation has been eliminated, with all the error-saving that this entails, and this the most arduous and soul-destroying work of the whole dissection operation. As to cost savings, it is reckoned that the cost of the service bureau work just about cancels out the saving in wages on the staff side. 'But,' he says, 'you just can't get the staff nowadays, anyway.'

The main problem ahead for Mr Forsythe is utilising the down-time of the Sweda machines. They block-punch all nine items of data (departments 1-99, £99-19-11) simultaneously in as little time as it takes the operator to key in the figures on the keyboard and press the record button. This speed of operation means that under normal business conditions (600 'light' orders per day) the machine will record all sale data in only two to three hours. Even at the peak of the Christmas rush, the machine will hardly be utilised more than four to five hours. However, it is intended that the various sales departments will utilise the machine for analysing sales per assistant as other more sophisticated uses for the spare time on the equipment are being planned. Parkinson, who said that work expands to fill the time available for its completion, might care one day to formulate another law about work increasing to fill machine capacities?

Under daily control—

14,000

components

Ronald Wilcox

PRODUCTION stock control and costing of some 14,000 motor components —8,000 of which are bought from outside suppliers — is the principal task now being carried out on a computer at Standard-Triumph International Ltd, Coventry.

The introduction of the computer—a Leo IIc system—which replaced conventional punched card systems (which were, in any event, due for renewal) has enabled Standard-Triumph to integrate around it a number of tasks in addition to providing the means of obtaining results much more quickly.

Integrating many tasks means that the computer [illegible] wide range of work, including subsidiary chores, but basically it produces the following major results:

1. A breakdown of parts used in car production during the previous 24 working hours.
2. A forecast of parts usage during the coming 24 working hours.
3. An automatic readjustment of stock records and stock values, giving a day-to-day picture of the component stock position.
4. Reports on high/low stock position, facilitating re-ordering of stocks which have fallen below minimum levels.
5. An up-to-date record of the ordering position vis-a-vis individual outside suppliers.
6. A stock valuation at the end of every financial period. (The financial period is four weeks, although not a calendar month.)

The suite of computer programs that have been written for the stock control procedures divide roughly into two.

The first set is designed to break down the motor cars built during the previous 24 hours into their component parts. This job sets curious problems since individual variations on a car, in

A car is nothing more than the sum of hundreds of mass-produced components, but to build a car all the components must be available, and information on component stocks must be at hand on a daily basis—at least that's what Standard-Triumph decided and installed a computer for

colour, trim, tyres, destination and extras, have complex results in the definition of a part's usage. For example, certain components may be used on a particular model only if it has left-hand steering, a heater, but no radio. Usage definitions based on particular combinations of three variables are commonplace and, in order to achieve an accurate breakdown from cars to components, the specification of each car built must be examined individually by the computer.

The data for this task are assembled from 'build schedules.' A short while before a vehicle is built it is completely specified in respect of its various options and optional extras. The specification appears on a document known as a tally*. A punched card is produced for every tally and is filed by basic model, in tally number order. The punched card is produced from a paper tape produced as a by-product of a Flexowriter operation. The eventual building of a particular vehicle is initiated by the issue of the build programme to the 'track.' Build programmes are collected at intervals throughout the day and by reference to the rota numbers on them, the tally cards corresponding to the vehicles are pulled from the file. At the end of the factory day shift the tally cards are fed to the computer for the breakdown.

Sets of parts which have identical usage conditions are called packs. A pack usage record is held on magnetic tape, consisting of a reference number for each pack and the combinations of variants on a car, which would call for the use of this pack. The computer compares every usage description with each car built, and accumulates for each pack the number used for the day's build.

The parts usage record sets out, for each part, the packs in which it is used, the 'number off' for each pack and the factory from which the part is drawn for the pack. By multiplying the 'number off' by the total usage of the pack described in the previous paragraph, for each pack in which the part is used, the computer calculates the total usage for each part from each factory.

Amendments to pack and parts usage records are inserted as often as necessary by punched cards.

It should be noted here that as well as calculating parts used during the previous 24 hours, the computer makes an approximate breakdown of parts requirements during the next 24 hours, based on an outline production plan.

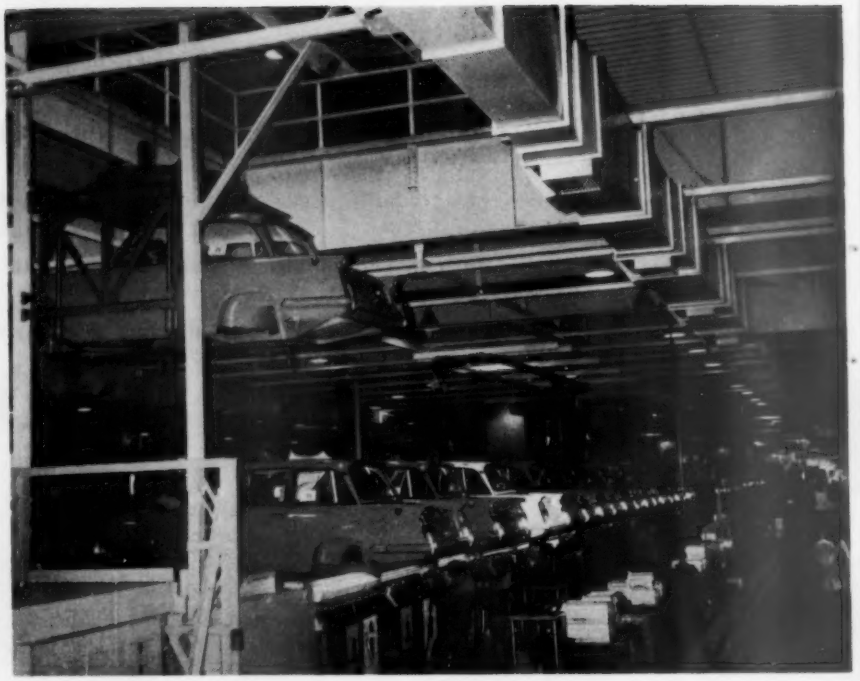
The end product of the first suite of computer programs is the production of a magnetic tape on which is listed the parts requirements for the build schedule that has just been broken down. This is put into the main stock control run, which is the second part of the main work.

FIGURES TAPED

Maintaining the stock ledger involves keeping an up-to-date book stock figure for every part held in production stores, a separate figure being required for

* See article published last month on how Standard-Triumph prepare tally documents for the 'build schedules.'

each factory or store. These stock figures are recorded on a magnetic tape (the parts' stock record) which is processed daily. During the processing, the stock figures are revised in respect of documented movements. Details of movements are contained on goods received and returns cards and movement cards. Both these cards are pre-punched with part numbers and descriptions, and the goods received card is also pre-punched with the supplier's number. These pre-punched cards are previously created by the computer as new parts or new suppliers are inserted in the record. All insertions or deletions of parts or suppliers are effected by punched cards fed to the main stock control program. Variable information such as quantity, type of movement and document reference numbers is inserted.



For each factory there is a record of each outside manufacturer who supplies each part, the order prices, the balance of orders outstanding, the code of the storekeeper responsible for that part of the factory, the desirable float of each part to be held in stock. For the company as a whole there is a record of the average price and the total stock holding value.

During the stock control run, each part on the stock record is updated by any goods received cards or movement cards submitted for the same part. If it is a movement card, the stock at the appropriate factory is adjusted, and if the movement is chargeable it is evaluated at the current average price for the part and an evaluated card punched for subsequent off-line processing. If it is a goods received card, the stock and supplier's order balance are both adjusted, the card evaluated at the supplier's order price and another card punched including this value, for invoice passing purposes. Additionally, the part's average price is adjusted. Any usage of the part contained in the magnetic tape breakdown of build is deducted from the stock at the appropriate factory. These issues, and any documented issues contained in movement cards, are accumulated for cost of issues purposes.

URGENCY REPORTS

When all this movement processing has been done for each part the residual balance is examined to see whether it is within tolerable limits of stock-holding. If it is too high or too low these facts are reported to the departments responsible. If it is too low it is further examined to see whether it is even too low for parts requirements during the coming 24 hours, and another report is made if it is so. This is by far the most urgent type of report, and the immediate availability of such information in an industry which carries stocks sufficient for a short period is vital.

Another examination is made of the balances outstanding on orders to individual suppliers. When these balances are reduced to a point where re-ordering is necessary this fact is reported to the department responsible.

At the end of each financial period the stock record at the time is processed for financial purposes to produce a stock valuation of about 40 cost categories of stock, cost of issues figures for the previous period, and also to produce model costings for different models, which are broken down in a manner similar to that used in the daily procedure. One car of each model is broken down as a sample. Instead of deducting parts requirements for a particular car from stock, the parts

In a sense the Standard-Triumph assembly line is dependent on the computer system: without a system of vetting what components were used and required the line would come to a standstill.

requirement is simply evaluated at an average price and as a result accumulated into total material cost of that particular model.

In model costing significant changes in material costs are highlighted. An average price is calculated by the computer by evaluating from the beginning of a period. The total stock value is the result of the stock at that time multiplied by the average price. As further receipts come in, if the price is increased the result is to increase the average in proportion to the ratio of stocks held at the two different prices. The groundwork for this is done daily as the goods received notes come in. A day-to-day average price is kept but use of it is principally made at a period's end when stocks are calculated and material costings revised.

Period-end work also includes the production of sundry financial analyses for management purposes. Excessive stock is evaluated and components whose excess over float exceeds a specified tolerance are reported. Total values of cost categories are compared with evaluated floats and nett excesses reported in total for each cost category.

Lists originating from the computer department at Standard-Triumph are received daily by the supplies division, production control, stores audit, central goods receiving and costing. Weekly lists are received by the supplies division and production control. Period-end lists are received by costs, stock audit and supplies division and, in some cases, by production control, overheads investigation, spares and internal audit. Interrogation reports are issued occasionally on stock information, order information, cost and financial information.

THE OLD WAY

The previous stock control and costing methods used by the company comprised a stock ledger of punched cards based on conventional equipment. This did not operate in a sufficiently swift cycle for information to be of use to production control or for availability purposes. It took several days to bring a balance up to date so, at best, a statement of stock availability was four days late and could be substantially inaccurate by the time it was produced.

The conventional systems produced stock figures that were useful for stock valuation but the information was only of partial use for stock control purposes. The computer has resulted in the integration of work done previously by several systems. Its speed enables it to be used for stock control functions without parallel systems being run. Quite apart from speed,* economy and integration, the system ensures a compatibility of methods used for production control, supply scheduling and financial work. (The build programming system, which employs Friden Flexowriter machines, was described in a separate article last month.)

* To illustrate the speed at which the work is performed, the first daily suite of programs could translate 1,000 cars into a full list of parts requirements in approximately one hour. The main stock control run, with a stock record of 14,000 parts, takes less than two hours.

The Payroll Centre

A new venture — a Dutch computer cooperative servicing over 200 firms — was the highlight of a recent conference held in Bristol

Lionel Trace

ONCE an intrepid conference-goer, now a more cautious one, I nearly passed up the one-day conference recently organised by the Bristol branch of the British Computer Society and cryptically labelled 'The Computer Co-operative.' However, a hidden voice suggested that perhaps a number of organisations were exploring the possibility of establishing a computer co-operative or syndicate in Bristol and that the conference was a way of feeling out the ground.

I was quickly disillusioned: Mr O B Chedzoy, secretary of the Bristol branch, said no, no group intended to 'go coop' in Bristol; they had heard of a computer co-operative centre working in the Netherlands, and it seemed a good idea to get the centre's director to come and deliver a paper.

In the event it was.

In July last year a number of Dutch employers' federations* decided they would establish the Society for Central Electronic Administration (CEA) with the aim of providing small and large companies with the advantages of data processing machines, and thereby relieving them of substantial clerical work.

Since then CEA have installed a Remington Rand USS 80 computer and are now processing payrolls for over 200 firms who between them employ more than 100,000 people.

That was the framework of the story that Mr J P Loorij, director of CEA, had to tell. Prior to purchasing a computer CEA had a working committee visit 16 variegated companies to get an idea of their payroll procedures. The committee unearthed almost as many procedures as companies and scratched heads as to what kind of machine would be required to process payrolls compiled in a diversity of ways.

A computer which could be switched quickly from one program to another—a machine with a sufficiently large memory to take a fairly complex program so that no payroll would require more than one run—these were among the main characteristics the committee thought they had to look for.

For it was with payroll applications that CEA were to be principally concerned.

Mr Loorij agreed that for a company to take on a medium size computer to do a payroll was rather like employing an anti-aircraft gun to bag a sparrow, but for a centre to do the same was quite different: the centre in fact has to handle a diversity of work (albeit payroll work) and so employs a data processing complex which is both flexible and fast—further, and this is the important point—the centre prepares a payroll at lower cost than a customer could. (This is because the centre operates as a non-profit-making unit.)

CEA made a study of the time it would take to transfer data to the centre, situated in Amsterdam, from a number of points in Holland and back again, and concluded that it would be possible in most cases to have data sent to the centre, processed and returned *within 36 hours*. Hence the centre was assured that it could deliver results sufficiently quickly for the requirements of most organisations.

Nevertheless, when several payrolls are being handled, as is now the case, it is not practicable to process data for all companies within one or two days. The work has to be staggered so that

* The federations were the Centraal Sociaal Werkgevers Verbond, the Verbond van Nederlandse Werkgevers, the Katholiek Verbond van Werkgeversvakverenigingen and the Verbond van Protestant-Christelijke Werkgever in Nederlans. Dutch employers' federations are organised along confessional lines.

the equipment is employed every working day.

NO TIME LOST

One significant feature of CEA's activities is the rapid and businesslike approach to getting a client to put his payroll in the hands of the centre; the stages for doing this and the time it takes are as follows:

1. After an approach has been made by a company a rough analysis of the procedure is made. This takes three days.
2. Then rough cost calculations are made and an approximate estimate is given to the company. This takes five days.
3. The company are then allowed 14 days in which to decide whether or not they want the centre to handle their payroll.
4. Then if the company says 'yes' to the centre's proposals, another 14 days are spent in doing a detailed and final analysis of the task.
5. The next stage is writing the computer program. This takes 28 days.
6. Finally, 14 days are devoted to program testing.

Thus, it takes about 11 weeks to get a payroll job working on the centre—from the time a rough survey is started to the time the payroll can begin to run on the centre's computer. Computer service bureaux in Britain might care to note how their timetables would compare with this one. The centre employs three systems and 14 programmers (automatic coding is, of course, employed).

DATA IN ANY FORM

One feature of the service is that CEA will accept the original data relating to a payroll in any form the client company wish to provide them. In fact, data are sent to the centre in four forms:

1. On the normal documents on which the company has always recorded payroll information.
2. On a special standard form prepared by CEA in which data are recorded in the best sequence for transferring to punched cards.
3. On punched cards, where a company already has card-punching equipment.
4. On marked cards which can subsequently be mark sensed and punched.

Within limits, the results of a payroll run can be presented to suit a company's requirements—for example, multiple copies or breakdowns of jobs, as well as certain analyses.

Firms who sign on with CEA do so for a three-year period (a contract is drawn up) and pay first an annual 'entry fee' of £10, then approximately 6s for each employee for the year. In addition, there is a charge of less than 1s for each payslip produced. So, with a labour force 500-strong being paid weekly, a company's annual payroll bill (including charges for programming, etc) would come to a little more than £1,300.

TRANSPLANTING?

Of course, the big question raised by Mr Loorij's paper is can the idea of a big computer co-operative be introduced in Britain? The answer hangs on who would organise such a co-operative and who would use its centre.

There are in Britain many more manufacturers' computer centres than in Holland, and consequently much more 'bureaux activity,' but of course the whole idea of CEA is that, being non-profit making, it can undercut manufacturers' centres.

Another speaker at this conference, Mr H W Matthews of Urwick Diebold, was clearly doubtful as to whether British employers' federations would want to establish such co-operatives.

He was also doubtful that payroll applications were the most profitable to put out to computer centres: CEA in fact intend to take on other payroll applications, but this is still a matter for the future.

There are more imaginative and profitable ways of using a computer than for payroll work, but if a number of companies decided to set up a 'payroll centre' just to get the work done cheaply, then Mr. Loorij's CEA have demonstrated that it can be done on a considerable scale.

How long does it take to put a payroll job onto a computer? Mr Loorij does a little blackboard work, figures it will take 11 weeks.

JOB MARKET REPORT

'OF course, it's an absolute rat race! '—the speaker was the managing director of a computer manufacturing company.

He was alarmed at the rapid turnround of both engineers and programmers, and the other categories of computer staff. This meant that some of the quite senior people employed had *never* seen a job through from start to finish. The average applicant now did not come to be interviewed: he did the interviewing—' I've five offers in my pocket; what's yours? '

A further complication in the ob melée is that, rather after the manner of the Club Milan in the football world, overseas territories were now putting out recruiting feelers. In addition to the USA and Canada, whose siren song of enticement has already been noted, Southern Rhodesia and now Australia are making efforts to attract British computer and punched card experts.

Australia is especially active, with powerful government backing; the Australian Minister of Defence has said that he wants a first line of 30 data processing experts, programmers, analysers and machine supervisors. These people are being offered between £1,600 and £2,400 per year and other fringe benefits.

In the US, the demand is equally acute. A major manufacturer there, who reckons to have trained 94,000 customer personnel during 1960, says that approximately 170,000 computer specialists will be needed in the US by 1966, and that by 1970 that figure will be doubled. The Industrial Manpower survey reported that computing personnel increased by ten percent in the year ending September 1960. Comparative figures for Britain are unfortunately not available.

Notwithstanding all this, pressure on the market seemed to be lighter in April; three advertisements for programmers, two for operational research leaders, nine for O and M men, and several miscellaneous ' fringe ' vacancies: for a market researcher in electronics, a statistician, a systems adviser, a couple of accountants, and four for punched card installation managers and operators. At least two of the advertisements were sponsored by EMI, for computer programmers, with a sideways glance towards systems investigators, and honours mathematicians, and for a statistician. No salary figure was given; an unnecessary omission.

The De Havilland company (part of the Hawker Siddeley group) who are working up an integrated data processing system based on a fast computer, wanted a complete top drawer ot computer experts — a chief programmer, three senior programmers, six junior programmers, three O and M assistants and two operational research workers. A Rhodesian vacancy is for a programmer to master-mind a calculator punched card department in a large copper mining company, and the applicant accepting the job is offered £1,300 or more, depending on qualifications, with a cost of living bonus of £65, and a 40 percent (of salary?) annual bonus. The overseas vacancies, perhaps because they have more to offer, are always much more specific than the English vacancies.

The operational research vacancies are repeats, save in the case of de Havilland. Richard Thomas and Baldwins (Project leaders of research, no salary specified) and BISRA (Operational Research, Data Processing, Process Control, degree in mathematics, economics, two years post graduate) have both featured before. BISRA invite the applicant to state the salary he expects, which shows realism or cunning.

The O and M vacancies continue to provide the major interest in the market. About half of these specify a job linked to a computer; Fords, who are now to have Leo IICs at both Dagenham and Aveley, want a man to investigate procedures throughout the company, and a man to plan future computer expansion; no salary is given in either case. Happily there are three admirably documented advertisements; Coopers, the accountants, acting on behalf of an Essex industrial group; Hepworth and Grandage; and the Co-operative Insurance Society. The Cooper advertisement gives the status of the applicant (senior O and M officer responsible to the data processing manager, 28-45, four years' experience in industry since qualifying, in systems analysis work, with a starting salary of £1,750). Hepworths give more details of the work involved (in a team preparing a data processing scheme for production control, accounting and stock control); the preferred age limit is 28-35; sound experience is needed of planning computer and punched card systems ; salary is given as up to to £1,500. The Co-operative Insurance list their requirements (degree or professional qualification, experience in the field advantageous), offer training, after which the applicant will be able to work with minimum supervision on improving clerical methods in conjunction with computer development section. They offer a salary of up to £1,235, and promise prospects of promotion. As a touch of rare imagination, they invite applicants to demonstrate their clarity of expression and abilities in document layout when replying.

The role of service bureaux

Keith Bean

This concluding article of the series on the insurance business looks at

—considerations for sharing a computer

—work done at computer service bureaux

—the special problems of companies specialising in motor insurance and in reinsurance

WHILE the large insurance companies—like the Prudential and the Commercial Union—can readily justify computing systems equipped with magnetic tapes, the smaller insurance offices, with no less complex problems than their peers, come up against the cost of these systems.

One answer to this problem is joint purchase of a computer by two or more companies; another is to make use of the service bureau facilities the computer makers offer.

These solutions do not obviate, however, the most stubborn costs—those incurred for systems analysis and programming, which are largely independent of the number of policies an insurance company has. Apart from the money there is the question of finding an analysis and programming team—say, anything from six to 20 men.

Although he is with the Royal Insurance Co—since its take-over of London and Lancashire, the biggest of the composite groups—A C Baker has studied these problems of the small company and reached the conclusion that one answer could be agreement between several life offices to share a computer or jointly hire computer time—provided they can maintain their separate identities and maintain freedom of action.

It appears, he says, that these aims may be achieved (a) at the expense of some programming efficiency and (b) provided that the individual offices are prepared to deal clerically with a higher percentage of special cases than a larger office

with its own computer and programming staff would expect to do.

'Basic policy record requirements of the smaller life offices are, in the main, not unduly different,' says Mr Baker. 'Several should be able to combine, and keep policy records on magnetic tape.

'I believe,' he says, 'a compromise could readily be obtained on the basic master block length (on magnetic tape)—say, 360 characters plus riders where required of 60 or 120 characters.

'Most items in the block will be common to all offices and a standardised block layout seems feasible, subject to the availability of a few unallocated words to be used by individual offices for information peculiar to their individual needs. Even some standardisation of character (or bit) positions within certain of these words may further simplify programming—*eg.* to simplify inter-radix conversions if the computer operates in binary code. The use of standardised layouts for feeding policy references, amendments and premium payments into the computer should impose no hardship.

'The print out of policy data from the master file would be made on to different pre-printed forms for each office. In this way the same word location in the master file record could be used for different data for various offices. This approach would simplify programming while retaining each office's individuality.

'In answering daily enquiries each office would remain free to apply its own actuarial formula and procedures to the policy data—*eg.* when quoting surrender values.

'The data required for ordinary life renewals is again of almost uniform content and few programming complexities would arise if offices wished to vary the layout of the data on pre-printed renewal notices. Here again, however, offices may have to accept some limits to the amount to be done by program. For instance, if a policy loan consists of several smaller loans at different rates of interest it may be required to consolidate the loans or deal clerically with the more complex ones.

'On the evaluation side, the master file may contain word positions for net premiums on one or two bases. The exact bases used may be kept confidential to individual offices. Each office would be able to insert its own valuation constants in a common valuation programme so that, here again, freedom of action may be retained without undue programming complexity.'

In forming the joint analysis and programming team each office would, to avoid delays by reference back on organisational points, provide at least one responsible official. Thus it should be possible to form a team which is actually more able than any office individually, whether large or small, could form on its own.

These are some general considerations.

SERVICE BUREAUX

More specifically, the shared approach has already been applied at one of the Leo computer bureaux where Eagle Star, Guardian, and Legal and General joined in asking for a number of programs for the renewal and valuation of mixed group life schemes—schemes which have both an endowment and a pension part to them.

This work, due to begin operationally very soon, is based on a main record magnetic tape file holding a historical record for each employee—his salary and status changes for pension purposes and various contracts he has entered into for endowment assurance purposes.

These schemes will be controlled by an elaborate parametrical system. A particular feature is that many of the schemes are assured by the three offices jointly and indeed parts of the schemes are often re-assured with other life companies.

When each scheme is taken on it will be updated to the current day for paid up and surrender values. At each renewal date, apart from a renewal schedule there will be a withdrawal schedule and, for the endowment assurance sections, acceptance lists detailing the information concerning new contracts entered into in respect of new entrants to the scheme, or status or salary changes in existing schemes. Valuation will be carried out as at December 31 each year when the necessary accounts and Board of Trade returns will be prepared.

Already the Leo centre has carried out what might be called a special case of this work—for Eagle Star, an application which was at the time the most ambitious undertaken in this country in insurance.

Renewals of the Eagle Star group pensions schemes were begun with a generalised program system in September, 1958, and have been carried out regularly ever since, first on Leo II/1 and later on Leo II/5.

First, beginning in April, 1958, the computer was used to calculate the up-to-date positions from historical records of schemes, some of which were over 20 years old.

The renewals program not only calculates the members' values but also prepares the valuation as at surrender date and makes the necessary calculations for employees withdrawing from the scheme.

This application is based on a punched card file of the information held in binary notation.

The data organisation aspect is particularly smooth since for each renewal a printed scheme

(to act both as client and insurance company record) and a decimal punched card are produced. The punched card is passed through a transfer interpreter and the information is printed on a pre-printed card. These cards are then sent to the client who on the next renewal date selects those cards for members who have had a change of status or salary, enters the change and returns the card to the insurance company. A punched card is produced for submission to the computer run.

Such a project as this, which caters for 500 schemes and many tens of thousands of policies, is controlled by about 50 parameters.

Even earlier, in 1956, the centre began on Leo I group pension scheme quotations for Legal and General, including the complex calculation of the spread of the past service pension contributions.

For Atlas the Leo centre has carried out since 1958 the renewals of one pension scheme for 7,000 employees—a complicated scheme calculating premiums, pensions, surrender values, paid up pensions, stamp duty and valuation.

Also for Atlas the centre began in January this year on Leo II/5, the renewals and valuation for current cost schemes including minimum benefit schemes. This is a generalised program, a special feature of which is the calculation of parameters by the computer for use in the valuation.

For Alliance the Leo centre began in 1956 one series of programs for quotations for three classes of pension schemes and another for the annual updating of pension schemes. In 1958 the Leo centre also worked on decreasing term assurance premiums for Alliance, preparing premiums based on the 1949/52 mortality tables for all terms 1-30 for all ages 25-63.

The first industrial branch valuation to be carried out on a computer in this country was on Leo II/1 in 1958, for London and Manchester. This valuation was of whole life and endowment assurance—sum assured, pensions and net premium being calculated to obtain the value of the reserve. The valuation was carried out again in 1959 and 1960 though this in future is to be transferred to London and Manchester's Pegasus computer.

Leo has also produced tables for the Institute of Actuaries since 1955—tables of monetary functions on a reduced mortality analysis, tables of joint life and mortality and A55 tables for annuitants.

Insurance jobs at the National Cash Register computer centre—where they have two National-Elliott 405s, is well illustrated by the work of Thomas R Miller and Sons, a relatively small company with only 18 accounts staff among its 80 employees.

The company administers the marine insurance work for the United Kingdom Mutual Steamship Assurance Association, a group of shipping owners who cover their risks on a mutual liability basis and have a total of 20 million tons of shipping sailing under 58 different flags.

To prepare punched tape for the computer Miller's use an accounting machine electrically wired so that data can be punched into tape as a by-product of normal book-keeping. They use the system for one of their most time-consuming jobs—payment of claims.

The accounting machine produces five documents in one posting operation—cheque, letter of payment, claims abstract, cashbook sheet and reinsurance document. While this is being done the following information is automatically captured on tape: class, currency, owner's number, vessel's flag or trade, form of ship's articles, voyage, year, type of claim, amount of claim. Every day the machine produces the documents for some 300 claims. With the previous manual book-keeping this work occupied five clerks.

The tapes, sent each month to the NCR centre, are analysed on 405 to provide information on which future risks can be assessed. The analysis is pretty exhaustive—risks are classified under 34 heads. Complete analysis of claims was previously impossible because of the prodigious amount of clerical effort needed.

The NCR centre does actuarial work for the Friends' Provident and Century Life Society. The society rings the centre periodically for tables to be calculated with certain mortality rates and loading factors. Usually these jobs take about half an hour of computer time. The same program is used for all applications — with adjustment of the constants or loading factors. The system enables the society to calculate rapidly premium rates for its rate book, to be used in different parts of the world in competing for new life business.

Unit accounting machines like the National Class 31 and the Burroughs Sensimatic are, of course, widely used in insurance. Nowadays they have the advantage that such functions as carriage tabulation, adding, subtracting, accumulating and printing can be automatically controlled by a program bar which simply clips on to the front of the carriage.

Automation is carried a stage further when these machines are coupled to ICT or IBM automatic card punches or to paper tape punches to provide input for electro-mechanical or electronic equipment, whether company-owned or at a service centre.

MOTOR INSURANCE

One company intends to use a computer for its motor insurance work and a program is being written for an ICT 1301 computer.

With such a system as this it should be possible to store within the machine the motor rate book and, at motor renewal preparation time, merely to present the machine the basic essential details of a car or a motor cycle; the computer, by reference to the data on the tape and the rates stored in the machine, would calculate the gross premium and, by reference to particulars of any claims included on the tape, to work out the appropriate NCD (no claims discount) and relative net premium.

Also, provided there is sufficient storage capacity in the machine available, all the statistical requirements of the Accident Offices Association could be accumulated concurrently.

ADP AND REINSURANCE

Inevitably most discussion of insurance data processing focuses on direct business, but the computer offers advantages of economy and efficiency over conventional punched card machines for the reinsurance office, too.

That at any rate is the conclusion of L A Whadham, chief accountant of Mercantile and General Reinsurance Co, which deals only in reinsurance—all types of reinsurance for all classes of insurance business. It has ordered an IBM 1401 for delivery early next year.

The reinsurance office has a very much smaller volume of data to process than the direct office writing a similar premium income. In many cases there is no information on the individual risks. Normally there will be one figure for all the premiums under each treaty in each currency each quarter.

But the reinsurer's data is usually more complex than that of the direct office. He probably writes business in many currencies and keeps accounts and statistical records in the original currency to minimise losses from exchange rate variations. His reinsurance will include all classes of business written by many ceding companies and the data will be further subdivided according to basis of reinsurance—surplus, quota share and so on.

He faces, in quarterly accounting, the time lag in getting accounts from ceding companies all over the world—which applies also to his yearly accounting. And, of course, results of each treaty must be provided in the terms of each ceding company's own year.

For the reinsurer the problem of translating data into machinable form is magnified by the fact that he has no control over the form in which his office receives the original data. His original documents are in any shape, form or language the ceding company may find convenient to itself.

The interpretation of the original information on to a standard form with appropriate coding calls for considerable skill, experience and care. Its cost can be offset only if big advantages are obtained by use of the computer in handling the prepared data which results.

To the reinsurer the great advantage of the computer is its speed. While the direct office can prepare renewal notices and various accounts in advance, the reinsurer does not know what premiums he will receive until he gets the ceding companies' accounts. Then, at each quarter, statistical and accounting figures must be prepared with all speed, since the data relates to direct business written about six months before and statistics will be out-of-date and valueless unless analysed quickly. Since some of the business is retroceded, the retrocessionaire will, for the same reasons, want his accounts quickly too.

For the reinsurer another great advantage of electronic data processing is the speedy availability of more detailed statistical analyses. For instance, up-to-date information on commitments in each currency is necessary so that efforts can be made to equate assets and liabilities to cushion exchange fluctuations.

If in sufficient detail, analysis by territory can be valuable. Political or economic factors may be important—in the territory of the ceding company or of the risk.

'The need for detailed analysis of this type means that mechanically the reinsurer is faced with problems of rearrangement of his basic file rather than with selection,' says Mr Whadam.

'This emphasis on rearrangement mitigates against magnetic tape. Sorting by magnetic tape requires large-scale machinery, but the office concerned only with reinsurance rarely handles a sufficient bulk of data to make the immediate cost of a medium or large computer economic. A relatively simple computer with punched card input seems to provide the best answer.'

This article concludes the series on 'ADP and the Insurance Business.' Previous articles in this series were published in the February, March and April, 1961, *issues of* AUTOMATIC DATA PROCESSING. *Other articles dealing with insurance data processing problems appeared in June,* 1960—*'Producing Renewal Documents' (Phoenix Assurance) and in July,* 1959—*'750,000 Policies on a Computer' (Trygg Fylgia Insurance Companies, Sweden).*

WHAT'S NEW

in systems, services and equipment

For Small Input to Large Computer

A MEANS of reading small quantities of data, late transactions, etc, into the tape-operated IBM 7080, is the IBM 7502 console card reader, which is capable of reading 60 80-column cards per minute directly into the computer.

This communications link, suggest the makers, could be used to load sorting control cards, data correction cards or program patching cards. Another application could be to determine the sequence of loading programs from the master program tape.

The cards are loaded on to a feed hopper on the 7502, and are fed thence to a single read station, where data is photo-electrically sensed, and converted into binary coded decimal character; one character will contain a complete column of information from the card. From there the data can be entered direct into the computer memory.

IBM hope to have the 7502 available in this country later this year, subject to demand. No sterling price has been specified as yet.

For further details tick EO1 on the reader enquiry coupon on page 41, or write to:

IBM United Kingdom Ltd,
101 *Wigmore Street*,
London, *W*1.

For patching your program

Check for Taped Reference Numbers

A MEANS of automatically verifying account and reference numbers in tape produced as a by-product of accounting operations is offered by the National 411 Check Digit Verifier. This small electronic black box, which measures only 12 inches by 8 inches by 5 inches, calculates pre-set scrambled totals of the account number—the final digit of the reference number—and so is able to ensure that the digits of the number have not been transposed or incorrectly entered.

The important factor in this checking device, say the makers, is that the check is carried out *before* the data is punched into the tape, in the split second between the keyboard entry on the accounting machine, and the punching of the tape. In this way the need for verification by the computer, wasteful of computer time, and frustrating when the tapes have been transmitted from a large number of out stations—branch stores, offices, etc, will be avoided. Corrections are thus made at source.

The verifier is cable connected to the tape or card producing equipment, and after the calculations have been set it will operate automatically without operator intervention. It will not discommode or slow down the punching operation in any way.

The principle on which the verifier works is that of the ' check digit,' as used in many computer systems. Under this sytem each digit in the account number is allotted a ' weighting ' digit. Each digit in the account number is multiplied by its weighting digit, and the products added together. The result is weighted by the final digit, to make a total divisible by 11. If the numbers are transposed, the verifier performing the division will not have a whole number as dividend. In that case the machine will cause a red light to be illuminated, and the punching operation to be held in suspense. The entry can then be made again, and if correct the punching will ensue. This correcting device can be used for checking punching of odd job numbers, part numbers, employee numbers, and other important

account and reference numbers in business and commerce, especially in the specialised field of banking.

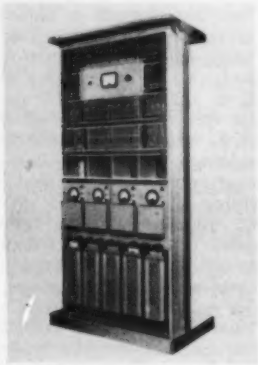
The device is already widely used in the United States, and is to be introduced here. Pending a decision as to whether a manufacturing unit is to be set up in the UK, National have so far been unable to quote a firm sterling price and delivery time.

For further details tick EO2 on the reader enquiry coupon on page 41, or write to:
National Cash Register Co Ltd,
206-216 *Marylebone Road,*
London, NW1.

Standardised Memory Component

A MEMORY unit designed for the Ferranti Atlas computer, but which is to be standardised and offered throughout the computer industry, is announced by the Plessey Company.

The memory system is designed on the ' hierarchy ' principle; that is to say there are four core storage units, interlinked by micro-programming techniques. The index store has a storage capacity of 128 50-bit words, with an access time of 0.35 micro-seconds. Linked to this is the tape-co-ordinating store with an access time of one micro-second; a working core store of 1,032 words of 50 bits, with an access time of somewhat less than 0.6 micro-seconds; and the main core store of 16,384 words in four groups of 4,096 words—with expandable capacity as required—which has an access time of somewhat less than two micro-seconds.



' Hierarchic ' memory

Plessey say that they are receiving enquiries for their memory systems from computer firms both here and in the United States and hope shortly to be able to give a standardised price for the equipment; the Ferranti figure cannot be given since there is the complication of dvelopment costs.

For further details tick EO3 on the reader enquiry coupon on page 41, or write to:
Plessey Co Ltd,
Ilford,
Essex.

Decollating waterfall for continuous forms

High-speed Decollator

A NEW method of decollating tabulating stationery at high speed is announced by Lamson Paragon Ltd. The decollator, known as the Waterfall, allows continuous multi-copy sets utilising one-time carbon to be separated at speeds up to 300 feet per minute.

The forms from the output printer are drawn up by abrasive rollers, and the carbon is fed through a split roller. Only one carbon can be removed at one decollator run; four part sets will be broken down into two sets of two, and these two sets broken down into continuous lengths.

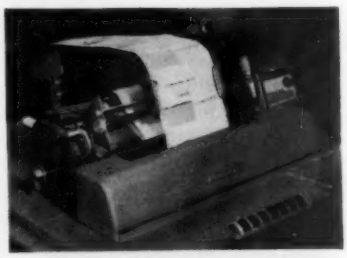
Forms may be of depths up to 12 inches, but must be loose, when passed through for decollation. The makers say the method is particularly suitable for forms using the Paraflex strip-off stub method or the hook-lock make-up.

The decollator takes up an area of 3 feet square and is compatible with most medium-speed tabulating printers.

For further details tick EO4 on the reader enquiry coupon on page 41, or write to:
Lamson Paragon Ltd,
Paragon Works,
London, E 16.

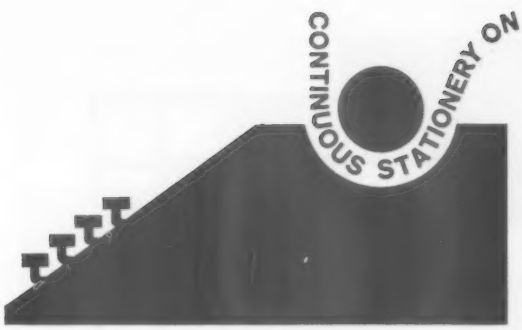
Carton Labelling Eliminated

A METHOD of raising tab-on stencils at the same time as the typewritten documents are prepared, is announced by Fanfold Ltd. The forms are supplied with the tab-on stencils in place which are prepared by the action of addressing the documents, special carbon below the stencil transferring the address details to the other forms in the set. The stencil will be detached after preparation and slipped into small hand printer, thus allowing the packing clerk to touch-stencil the address direct on to the carton or wrapper.



From tabulator to hand printer

This gives a double advantage. First, there is no time wastage in the address and affixing of labels. Secondly, the one stencil can be used



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1 No special attachment required on your typewriter
2 No need to install a costly special-purpose billing machine.
3 No time wasting threading through a carbon glove and 'of course' no carbon paper to handle.

It's so simple and quick, just type and tear off. Supplied through printers and stationers only but please write for samples.

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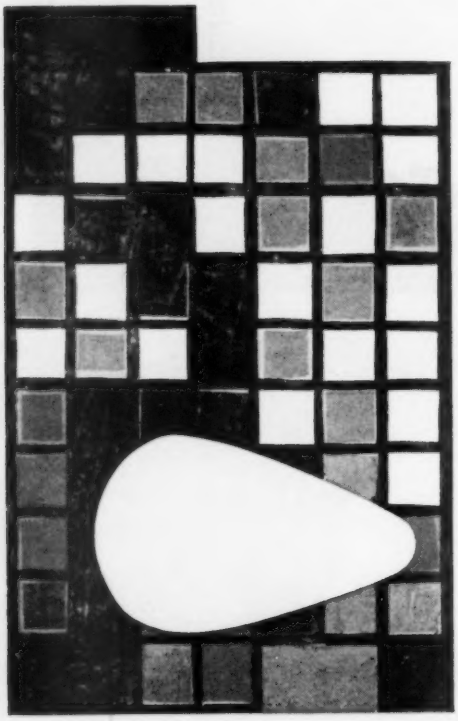

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International Computers and Tabulators Limited

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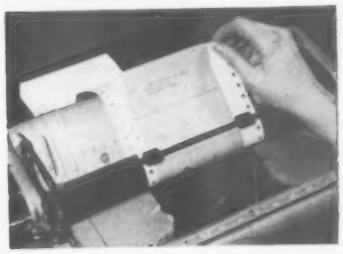
for a number of cartons thereby saving trouble on multiple shipments. One stencil can make several thousand impressions, which are proof against moisture, fading, smudging or rubbing-off.



Stencil can be continuous

The tab-on stencil may be incorporated with forms for use with typewriters, teleprinters, and tabulations. Where addressing cannot be carried out at the time of document preparation, a special stencil is provided. Known as the Continumatic, it consists of stencils in continuous length attached to a marginally punched backing sheet. These stencil sets can be used both with tabulators and typewriters.

For further details tick EO5 on the reader enquiry coupon on this page or write to:
Fanfold Ltd,
Bridport Road,
London, N18.

Electronic Air Cleaner

DUE to be installed shortly in the Commercial Union assurance organisation's computer centre in Exeter, is the Honeywell electronic air cleaner. The first, say Honeywell, to be installed in the UK. The cleaner system is slipped as a complete unit into the main air duct, and the cleaner cells are slotted in. The air entering the duct is electrostatically charged, and the particles thus magnetised are attracted to a' baffle ' on one side of the duct.

The cleaner is thus able to trap particles of very fine dust, bacteria, fumes, of .01-50 microns; normal dust filtration is of the order of 5-50 microns. The makers claim that the electronic cleaner is able to operate at as much as 95 percent efficiency. Cost of the system is not given, since each equipment is tailor made.

For further details tick EO6 on the reader enquiry coupon on this page or write to:
Honeywell Controls Ltd,
Ruislip Road East,
Greenford,
Middx.

Copyholder Aids Wiring Assembly

ONE of the problems of electronic wiring and other operations connected with the assembly and maintenance of computers is that operations must be performed in strict sequence at a given time, and that each detail of wiring must be accounted for. The detailed instructions of these runs into many pages. The difficulty lies in keeping track

Brief at eye-level

of the instruction sheet while at the same time, carrying out the instructions, without losing the place on the sheet, or allowing it to become soiled.

The Lindicator copyholder, say the makers, Lindication Ltd, may provide the answer. The instructions will be on a continuous sheet, an endless belt of paper travelling between rollers continuously.

The apparatus will look like a letterbox in the aperture of which

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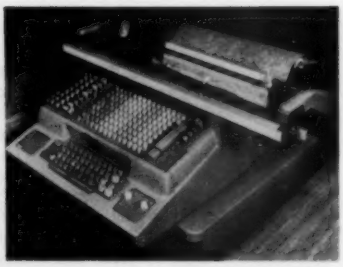
will appear the line of the instruction which has to be performed; a magnifier will allow enlargement of small type. When the instruction has been carried out the operator will depress a lever or foot pedal and the next line of instruction appears in the aperture; a positive stop prevents this sheet from running on beyond the prescribed line. In this way the operator has at eye-level his particular instruction in the right order and sequence, without having to fiddle with sheets, and can carry through a series of detailed instructions in strict sequence. The makers feel that this equipment might well do away with the need for a ' fault-finder ' on the factory floor.

For further details tick EO7 on the reader enquiry coupon on page 41, or write to:

Lindication Ltd,
Mark Road,
Hemel Hempstead,
Herts.

' Exception Reports ' by Accounting Machine

A NEW accounting machine designed with management analysis very much in mind, has been announced by National Cash Register Company.



Selective data captured

This accounting machine, the National 33, is able to perform nearly 100 different operations automatically. The operations are controlled by the interchangeable program bar, made to user requirements. Where extended analysis is required the machine can be linked to automatic data capturing equipment, which punches selected items into either cards or tape.

The machine can be programmed to select one of two courses of action, by testing intermediate data. If a certain commodity is shown as being below the programmed safety level, the machine will automatically print out an action note. This facility can be extended to cover all exception figures in accounting and bookkeeping.

The makers anticipate that the machine will be used for stores control—producing re-order notes automatically; contract and job costing analyses and production control records; invoicing and ledger posting producing simultaneous sales records; remittance advice, cheque writing with payment analysis; payroll in a number of other accounting operations, for both small and large firms.

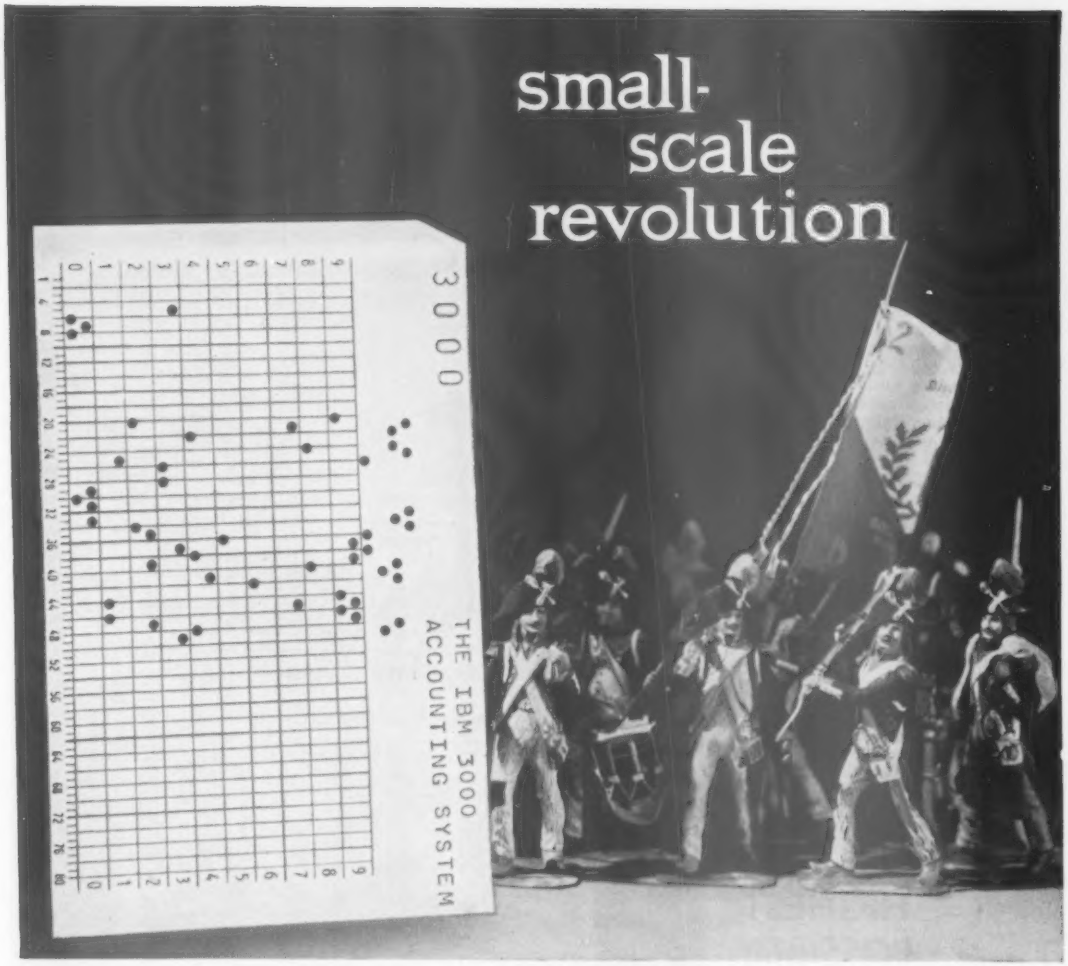
The machine is equipped with 21 adding and subtracting registers, up to four of which can be used simultaneously.

Totals accumulated in the registers can be printed out—with or without clearing the registers by pressing single keys. Credit/debit capacity is up to £9,999,999,999-19-11—the same as the keyboard—and automatic credit and debit balances are provided, which can be accumulated separately, though printed in the same column.

Four of the registers can be allocated to automatic serial numbering, so that in one posting in four sets of serial numbers can be simultaneously utilised. The machine costs up to £3,800 and delivery time is given as 12 months.

For further details tick EO8 on the reader enquiry coupon on page 41, or write to:

National Cash Register Co Ltd,
206-216 *Marylebone Road,*
London, NW1.



Card shown actual size.

Small, compact, exceptionally low in cost, the IBM 3000 data processing system is a revolution for the smaller business. IBM designed the 3000 system specially for these companies, who can at last have the proved advantages of data processing—accuracy, speed, economy and management control—at a price they can afford.

THE CARD, about as big as a playing card, contains a full 80 columns of information.

THE CARD PUNCH, no bigger than an electric typewriter, is a dual-purpose machine used for card punching and for verification.

THE SORTER sits snugly on a desk top and sorts 460 cards a minute.

THE ACCOUNTING MACHINE:

* Operates at 90 cards a minute
* Performs the normal accounting machine functions, i.e. add, subtract, store, accumulate, select, print and skip.
* Multiplies, divides, acts as a calculating punch, and performs some collator functions.

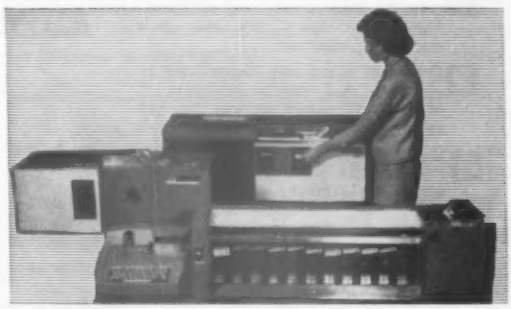
THE INTERPRETER prints selected information at the top of the card.

No other accounting system in the world combines all these functions in so compact a form.

The demand for the IBM 3000 system is increasing week by week. Of the many already sold in Britain, the first was ordered by a firm of printers, Unwin Brothers Limited. For further details please get in touch with any IBM branch throughout the country, or with

IBM

IBM UNITED KINGDOM LIMITED,
101 WIGMORE STREET, LONDON,
W.1. WELbeck 6600



CRC 87

Leo III enlists for Fort Dunlop

IN 1962 a Leo III Automatic Office, the fastest, most flexible, and most reliable Leo yet, will start work at Fort Dunlop, the largest factory in the world-wide Dunlop organisation, where the famous Dunlop tyres are made.

What Leo III will do for Dunlop

It is planned that the installation will progressively take care of a wide variety of functions. At Fort Dunlop, LEO will produce invoices and accounts for the vast tyre replacement market—garages and distributors whose 5,000 orders a day are chosen from 30,000 different items.

In an integrated system it will produce more informative and more up-to-date sales statistics and will forecast future sales, taking current trends and seasonal factors into account. From these forecasts and statistics, LEO will be able to arrange automatically for the replenishment of Depot stocks, and make a breakdown of production requirements for scheduling purchases and manufacturing loads.

In addition to this, LEO will analyse factory production and report to management on deviations from budgeted performance and costs. It will control stocks of raw materials, engineering parts and finished products. And it will do all the necessary calculations for the 9,000 employee payroll.

The fastest Leo yet

LEO III will be able to handle this great work load because it is fast even by computer standards. It is fully transistorised. It reads and records on high-speed tape decks. It prints its results on an Anelex machine at 880 lines per minute. Time sharing arrangements ensure that the computer itself never has to wait for ancillary equipment to catch up with it.

LEO III can even work on several jobs at the same time, sharing its large magnetic core 'memory' between them automatically. And no expense has been spared to make it more reliable. In fact, LEO III is so reliable that special 'breakdown exercises' have had to be devised to keep maintenance engineers in practice.

What Leo III can do for you

- Invoicing and sales analysis
- Sales forecasting
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- Accounting, costing and payroll
- Dividend warrants and registrars' records
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PARTS DIVISION

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Applicants should possess a high degree of intelligence and be capable of accurate and logical thinking. An analytical approach and possession of at least three subjects in the G.C.E. at 'A' level, including mathematics, is essential for these positions.

Experience of computers would be an advantage, but training will be given to suitable young men in the 20-24 age group.

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FORD MOTOR COMPANY LIMITED, Dagenham, Essex.
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A graduate in the Electrical Electronic field is required to form an Applications Section in the Magnetic Materials Sales Department. This is a new post with a varied and interesting range of functions, including visiting customers and development of magnetic devices.

Experience of modern circuit technology as applied to ferrites would be a distinct advantage.

The commencing salary will be not less than £1,200 p. a.

Comprehensive personal benefits include non-contributory Pension Scheme.

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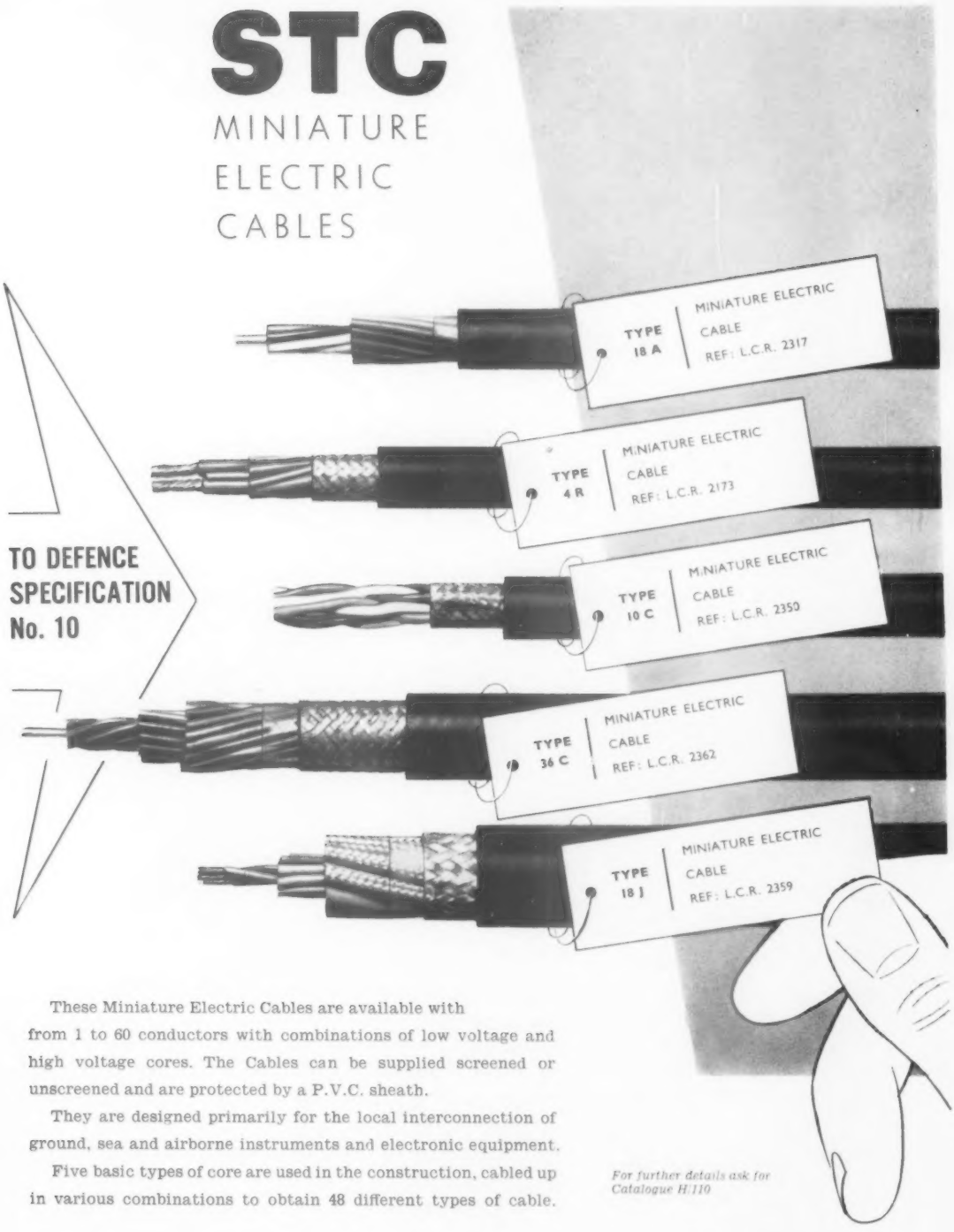

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These Miniature Electric Cables are available with from 1 to 60 conductors with combinations of low voltage and high voltage cores. The Cables can be supplied screened or unscreened and are protected by a P.V.C. sheath.

They are designed primarily for the local interconnection of ground, sea and airborne instruments and electronic equipment.

Five basic types of core are used in the construction, cabled up in various combinations to obtain 48 different types of cable.

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KDP 10

The 'ENGLISH ELECTRIC' **KDP 10** Data Processing System incorporates a number of unique design features. It is extremely flexible and is designed to handle a wide variety of commercial data processing applications. **KDP 10** is a complete system using alphanumeric data and has magnetic tape, punched tape, punched card input/output, together with printed output.

To ensure maximum operational reliability solid-state devices and printed circuits are used throughout.

The high speed store is available in increments of 16,384 character locations up to a maximum of 262,144 locations. Each location is individually addressable and can store any one of the 64 alphanumeric characters in the system code. **KDP 10** has total variability of item and message length, but fixed or fixed-variable lengths may be used.

Peripheral equipment includes tape punch and tape verifier, monitor printer, high speed line printer, paper tape reader, punched card equipment, and magnetic tape units operating at 33,333 or 66,666 characters per second.

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